NATIONAL MUSEUM OF VICTORIA

Vol. XIX. Part 1.

[Registered at the General Post Office, Melbourne, for transmission by Post as a Newspaper.]

The Journal of the Department of Agriculture of Victoria, Australia.

January, 1921.

PRINCIPAL CONTENTS

Control of the Source of our Milk Supply

Dairy Type in Bulls

Peach Growing

PRICE THREEPENCE. (Annual Subscription—Victoria, Inter-State, and N.Z., 3/-; British and Fore

Berseem Clover

A Wonderful Winter Fodder Plant

BERSEEM CLOVER

Brunning's Genuine "Mesgawi"

has been tested, tried, and proved a splendid proposition. Can be pastured, cut for green feed, or made into hay. Cleanses the land of weeds, can be ploughed in for green manure, adds humus and nitrogen to the soil. Unequalled as a predecessor to Lucerne. Berseem is the heaviest producer of all Winter Fodders—yields up to six cuttings in a season. Every Farmer should have a crop.

WRITE FOR FURTHER PARTICULARS

GOOD PROFITS ASSURED FROM

SKINLESS BARLEY

Easily grown and extremely profitable, makes splendid Winter Fodder and early Hay. Several cuttings can be expected. Good returns are assured when grown for seed. Use the white seeded variety for hay and seed—the black, for green feed and seed.

IMPORTANT NOTICE! Brunning's Seed is re-cleaned, tested, and machine-dressed.

Best Results Assured. Samples and Quotations sent on application.
Country Orders attended to with promptness and despatch.

BRUNNINGS

(F. H. BRUNNING PTY LTD)

EVERYTHING FOR THE FARM, GARDEN, & ORCHARD.

64 ELIZABETH ST. MELB.

NATIONAL MUSEUM OF VICTORIA

THE JOURNAL

OF

THE DEPARTMENT OF AGRICULTURE,

VICTORIA, AUSTRALIA.

CONTENTS.—JANUARY, 1921.

		PAGE
The Control of the Source of our Milk Supply ...	*W. A. N. Robertson, B.V.Sc.*	1
Peach Growing in Victoria	*A. G. McCalman*	7
Dairy Type in Bulls	*J. S. McFadzean*	17
Look After the Bull	*R. T. McKenzie*	24
Some French Sweet Wines	*F. de Castella*	25
A Gippsland Pioneer's Work	*J. S. McFadzean*	31
Spotted Wilt of Tomatoes	... ...	36
Potato Production—It Pays to Spray	*S. G. Harris*	37
The Value of Milk Records	*R. T. McKenzie*	45
The Caringberry	... ...	48
Artificial Fertilizers Registered for 1921	*P. Rankin Scott*	50
Bricklaying a Cow-Shed Floor	*A. J. Gill*	60
Orchard and Garden Notes	... ...	62
Reminders for February	... ...	64

COPYRIGHT PROVISIONS AND SUBSCRIPTION RATES.

The Articles in the Journal of the Department of Agriculture of Victoria are protected by the provisions of the Copyright Act. Proprietors of newspapers wishing to republish any matter are at liberty to do so, *provided the Journal and author are both acknowledged.*

The Journal is issued monthly. The subscription, which is payable in advance and includes postage, is 3s. per annum for the Commonwealth and New Zealand, and 5s. for the United Kingdom and Foreign Countries. Single copy, Threepence.

Subscriptions should be forwarded to the Director of Agriculture, Melbourne. A complete list of the various publications issued by the Department of Agriculture will be supplied by the latter.

W. & W. 749

Cyclone

METAL GATES AND FENCES

PERFECT IN DESIGN, MATERIAL, AND WORKMANSHIP

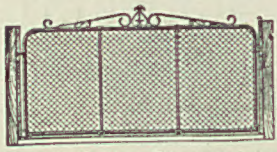


Fig. 112—Cyclone Driveway Gate

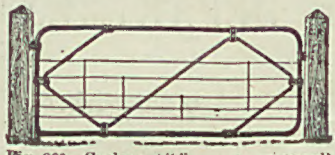


Fig. 201—Cyclone "Z" [illegible] (registered)

Fig. 181—Cyclone "Pig" Gate, 3 ft. 6 in. high

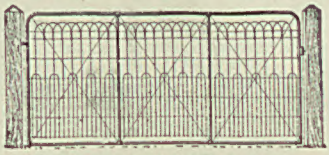


Fig. 191—Cyclone "F" Fabric Driveway Gate

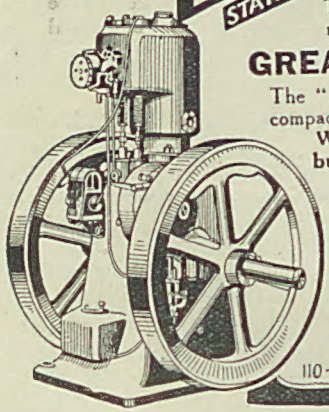
MANY STYLES ARE SHOWN IN OUR CATALOGUE WHICH IS POSTED FREE

CYCLONE Pty. Ltd. 459 Swanston Street, Melbourne
Also at Sydney and Adelaide

Petrol & Kerosene
2. 3. 5. 7
& 9. B.H.P.

LISTER ENGINES

STATIONERY □ BRITISH BUILT □ & PORTABLE



No need to put up with "half-hearted" power. The "Lister"—most efficient and powerful engine now to hand again.

GREATLY REDUCED PRICES

The "Lister" is acknowledged as the most powerful, compact, reliable, and steadiest running engine made **With High Tension Magneto Special Carburetter** (without float). Simple constructi n. 4000 sold in Australia. Automatic lubrication, throttling governor, dust-proof bearings.

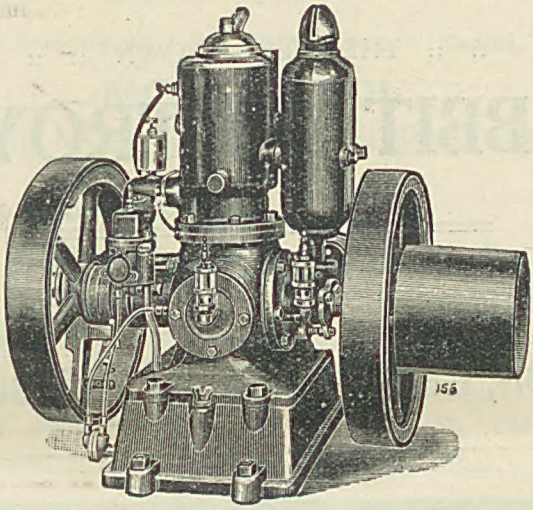
Experts will erect and start free. Get Catalogue.

New shipment landed. Ready for instant delivery.

LANGWILL BROS. & DAVIES Pty. Ltd.
110-114 Sturt St. South Melbourne

TERMS £10 CASH BALANCE EASY

"WALLABY" Petrol Engines



For All Farm Work Requiring Stationary Power

RUNNING on a fuel consumption of approximately ½ to ¾ pints per B.H.P. per hour, the "Wallaby" Engine provides an efficient source of power for Chaff Cutting, Threshing, Pumping, Wood Sawing, Shearing, Separating, &c.

Because of its simplicity, and reliability in action, it is very easy to start and operate. No expert attention is necessary.

Each "Wallaby" Engine is subjected to exhaustive trials under brake test, in order to ensure perfect running and reliability on a normal fuel consumption.

The "Wallaby" Engine is made in Australia—by highly skilled workmen—from best Australian materials. We can supply 1½, 3, 5, 7, 10 B.H.P. sizes, in stationary and portable types.

Make the work on your Farm or Dairy easier, and get through it more quickly, by installing a "Wallaby."

Send for our Booklet "Economical Power for the Farm or Workshop."

391-403 Bourke St. Melbourne

JOHN DANKS & SON-Pty. Ltd.

324-330 Pitt Street Sydney

TOXA

NO Danger of FIRE!

:: :: THE WELL-KNOWN :: ::

RABBIT DESTROYER

In 2-lb. Tins, 5/3 per Tin

FELTON, GRIMWADE & CO., MELBOURNE

NEW ZEALAND

Loan & Mercantile Agency

COMPANY LIMITED

Head Office— LONDON

Melbourne Office— COLLINS ST. W.

Liberal Cash Advances

Wool, Grain, Skins, Hides, Tallow, Bark, Stock and Station Brokers

ON COMMISSION ONLY

Butter Shipments Undertaken on Owner's Account

Agents for

COOPER'S SHEEP DIP

For Victoria and Riverina

PAGE'S PATENT WIRE STRAINER and IRONSIDE'S WIRE CUTTER

Chief Agents in Victoria for the PALATINE INSURANCE CO.

WAIT & SEE

WHAT SPLENDID RESULTS YOU WILL GET IF YOU DIP IN COOPER

FARMERS and GRAZIERS

The application of a heavier dressing of Superphosphate will produce

MORE WHEAT.

The top-dressing of your pasture means

MORE WOOL,

MORE MILK, and HEALTHIER STOCK.

ADDRESS YOUR INQUIRIES TO—

WISCHER & CO. PTY. LTD.

Manufacturers of Superphosphate, and Special Fertilizers for all Crops.

OFFICES:
153 William St., MELBOURNE.

WORKS:
Whitehall St., YARRAVILLE.

TREES and SCRUB
ST. JOHN'S WORT
THISTLES BRIARS
BLACKBERRIES
BOXTHORN
COUCH FERNS
FURZE SORREL

NOXIOUS WEEDS

Every square foot of ground is valuable now-a-days—far too valuable to be usurped by undesirable weeds and scrub. Why should they sap the vitality out of ground which should contribute to your storehouse or granary?

"VALLO" Brand Weed Scrub and Tree Killer

is the speedy, sure, and economical means of cutting short their existence. "VALLO" is not an experiment. It is an absolute exterminator of any and every kind of noxious growth. Whether your trouble be giant trees or common sorrel, put "VALLO" on the job and you'll be impressed by what it can do.

PRICES—56 lbs., 70/-; 15 lbs., 21/3; 7 lbs., 10/6; 1 lb., 2/-; ½ lb., 1/3

Manufactured by

A. VICTOR LEGGO & CO.

Melbourne — Sydney — Brisbane

Bonedust, Superphosphate,

And Other High-Grade Fertilizers. Poultry Bone Grit, Meat Meal, Cattle Lick

DELIVERED AT RAILWAY STATION, FOOTSCRAY, OR ON WHARF, MELBOURNE

J. COCKBILL, BONEDUST MANUFACTURER

OFFICE: 407 POST OFFICE PLACE, MELBOURNE

BONES BOUGHT. CONSIGN TO ME, FOOTSCRAY. Telephone 2098.

BLYTH'S TRADE MARK WILL NOT BURN FOLIAGE REGISTERED ARSENATE OF LEAD

Ten Years Practical Tests

The Renowned

"BLUE BELL"

Arsenate of Lead

Secure your orders at once.

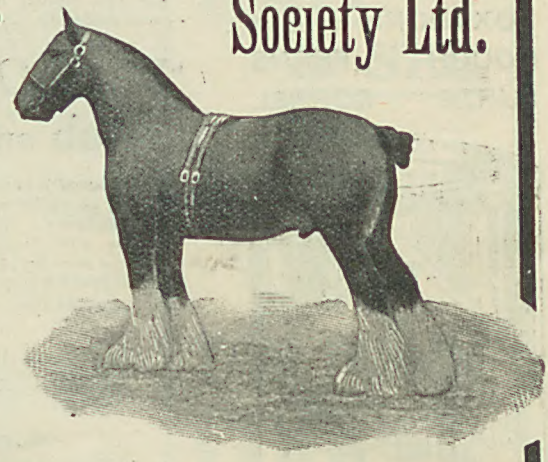
F. W. PRELL & CO., 31 Queen St., Melbourne

SOLE VICTORIAN AGENTS

'Phone 7419 Central

The Australasian Mutual Insurance Society Ltd.

400-2 Collins St., MELBOURNE.



Live Stock Insured

at Lowest Current Rates obtainable in Australia.

OTHER DEPARTMENTS OF BUSINESS.
Fire, Marine, Fidelity Guarantee, Plate Glass, Personal Accident and Sickness, Employers' Liability, Workmen's Compensation, Public Risk, Motor Car, and Burglary.

INSURE WITH THIS SOCIETY, AND RECOMMEND IT TO YOUR NEIGHBOURS

RESULTS TELL!

FARMERS, THIS WILL INTEREST YOU

The following is the average yield obtained in the wheat plots at Longerenong Agricultural College for five years ending 1919 :—

MANURE.	Average Yield for 5 Years.	Increase due to Manure.	Profit Taking Wheat at 4/- per Bushel.
	Bushels.	Bushels.	
1. No Manure	23·8	Nil.	—
2. Superphosphate, 56 lbs. ...	30·4	6·6	£1 6 5
3. Superphosphate, 1 cwt. ...	31·5	7·7	£1 10 10
4. Superphosphate, 2 cwt.	**33·1**	**9·3**	**£1 17 2**

INCREASE THE DRESSING OF SUPERPHOSPHATE PER ACRE, and obtain the maximum profits from the acreage cultivated. Don't forget the following improvement in the stubbles. Try an increased dressing this year for yourself.

Works—
Yarraville
(Vic.)
Nth. Fremantle
West Australia

M.L.

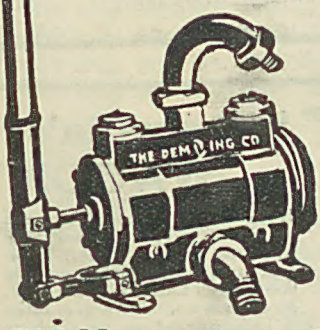
SUPERPHOSPHATE
FOR WHEAT

MOUNT LYELL CHEMICAL WORKS

Office—
"Collins House,"
381 Lt. Collins
Street,
Melbourne

Tools for the FARMER, GRAZIER AND ORCHARDIST

We sell most every Tool and Appliance for "The Man on the Land," and will be pleased to post illustrations and particulars of any Tool free on request.



"Iron Age" Cultivators,
Harrows, Plows,
Seed Drills,
"Iwan" Post-Hole Diggers,
Forges, Anvils, Drills,
Stocks and Dies,
Pumps and Piping,
Pruning Tools,
Earth Scoops,
Levelling Instruments,
Saw Benches,
Lifting Jacks,
Rope Hoists,
Crowbars, Spades,
Bag Trucks,
Scales,
Green Feed Cutters,
Grinders,
Wire Strainers,
&c., &c., &c.

582-88
Collins St.
MELBOURNE

McPherson's
Proprietary Limited

Established
1860

FARMERS!—CO-OPERATE!

MAKE YOUR OWN { 1. FERTILIZERS
2. PROFITS

You have already built up your own organization
COMPLETE IT

We invite your application for particulars of or concerning the Company.

TAKE SHARES
SHARE PROFITS
—IN—

THE PHOSPHATE CO-OPERATIVE COMPY.

of Australia Limited
(Registered)

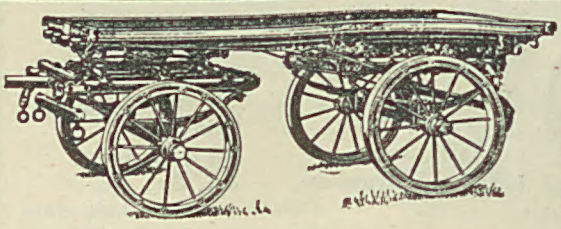
Standard Superphosphate will be manufactured from South Sea **(Nauru, &c.)** or **Florida Rock**

Registered Office—
545 Little Collins Street,
MELBOURNE

JAMES B. ROBERTSON,
Acting Secretary.

LYSAGHT'S
ORB
CORRUGATED ROOFING IRON

is again in full supply throughout Australia and is obtainable from all leading Ironmongers and Timber Merchants



"Australia's WAGON"

Hildyard Steel Wheel Wagons at the Front. They are now fitted with twin roller bearings, 33 per cent. saved in draft. More durable than ever. Less wear and tear. No boxes to crack. We guarantee them. The rollers run in oil in dustproof races. They are now perfection, and we can supply to carry all weights as usual for wool, wheat, or farm. Ordinary axles supplied if preferred.

J. J. Gordan (Ardlethan) says:—"The 5 ton, 36 in. and 40 in. dia. wheel wagon you supplied me runs splendid. I am putting 60 bags of wheat on 2 horses. That proves its light draught."

Send for Catalog Now **HILDYARD WAGON WORKS,** KENSINGTON, MELBOURNE, VIC.

He turns pretty slow— but he gets all the cream!

—owing to the wonderful Suction-feed, which insures just as clean a skim when you turn the Sharples separator slow, as when you turn it fast! The boy might turn the crank only 35 to 40 turns per minute, but he would get just as clean a skim as if his dad were speeding the crank around at 50 turns per minute.

The hired man, especially at the end of a hard day's work, will but seldom turn a separator up to regulation speed. And you, yourself, are often "dead-tired" and slacken down unconsciously. All fixed-feed separators when turned below speed lose cream—from 7 to 13 lbs. per cow per year. This loss totals 80 million lbs. of butter yearly in the United States alone—Sharples can save it all!

SHARPLES

Famous Suction-Feed
"Skims clean at any Speed"

SEPARATOR

—the *only* separator that skims clean at widely-varying speeds
—the *only* separator that delivers cream of unchanging thickness—all speeds
—the *only* separator that skims faster when you turn faster
—the *only* separator with just *one* piece in the bowl—no discs, easiest to clean
—the *only* separator with knee-low supply tank and a once-a-month oiling system

Discard your old fixed-feed separator. Get a new Sharples Suction-feed —the *only* separator that feeds the milk into the bowl *in direct proportion to the separating force,* thus getting 5% more cream under average conditions! Write to-day for catalog.

Agents

Newell & Co., Melbourne
John Bridge & Co., Sydney
Elder Smith and Co., Adelaide
Clark & Fauset, Brisbane
Chas. Atkins & Co., Perth
J. R. Green, Launceston

DELCO-LIGHT

Will give you instant ELECTRIC LIGHT in every room in your house and on your farm

Have you ever compared the comforts of city life with country life? One of the greatest comforts and conveniences in the city is electric light and power. Yet electric light and power can be just as easily installed in your home if you use a Delco-Light. With a Delco-Light you can have a light in every room, outhouse, and barn in your country home or farm.

You can have enough electric power to drive small machines that are usually run by hand, such as a separator, churn, electric fan, iron, &c. This means a wonderful saving of time and work for yourself and wife. Delco-Light is a compact, self-contained electric lighting plant, easy and economical to operate.

WRITE FOR PARTICULARS

WARBURTON FRANKI (MELBOURNE) LIMITED

380 BOURKE ST., MELBOURNE

DOOKIE AGRICULTURAL COLLEGE

Provides Special Facilities for Practical and Scientific Agricultural Education

Notable Agriculturists say that this College offers the best agricultural education and practical training in the world

THE COLLEGE YEAR COMMENCES IN MARCH — STUDENTS MAY BE ENROLLED AT ANY TIME

Alternative Courses—
(a) Diploma Course .. Three Years.
(b) One Year's Course.

Total Fees—
£25/-/- per annum.

The college contains modern and well equipped laboratory and lecture hall, single bedrooms, recreation and sports grounds.

Of the 5,913 acres of farm land at Dookie, 1,000 acres are put under crop by students each season; and champion prizes were won for sheep and pigs at the Royal Agricultural Society's Show.

FARM SUBJECTS.—Agriculture, Animal Husbandry, Poultry, Fruit Growing, Butter and Cheese Factory Management, Building Construction for Farmers.

EACH BRANCH UNDER SPECIALLY TRAINED EXPERTS

LONGERENONG AGRICULTURAL COLLEGE

SESSIONS COMMENCE MARCH AND SEPTEMBER

This College is specially adapted for Junior Students from 14 years of age

AREA OF FARM, 2,336 ACRES

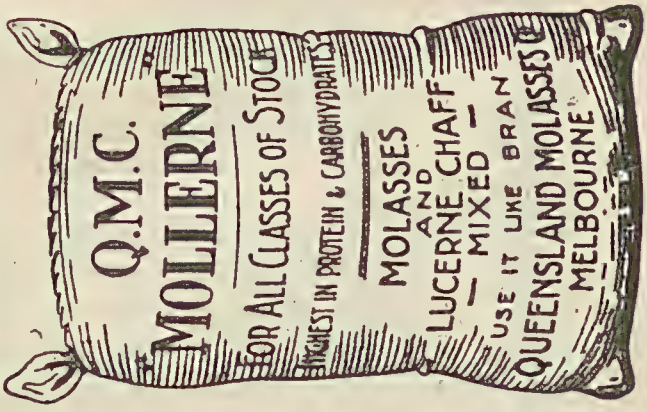
MAIN BRANCHES OF FARM WORK.—Grain Growing, Fat Lamb Raising, Dairying, Irrigation of Fodder Crops, Fruit, &c.

Total Fees—£25 per annum.

Full particulars obtainable from T. J. PURVIS, Esq., Secretary, Council of Agricultural Education, Public Offices, Melbourne, or the Principals of the Colleges.

MR. A. E. V. RICHARDSON, of the Victorian Agricultural Society, in "Science and Industry," July, 1919, says—

The Queensland Molasses Co. makes a product called "Mollerne" from Molasses and Lucerne, and sells it at £1 higher than the market price of Lucerne. An analysis of it has been made by the Agricultural Chemist, and it forms a cheap and valuable food for ewes and young lambs.



"MELROSE" JERSEY STUD FARM

A Champion Dairy Herd of Victoria

1st Prize Herd	1916	and	1918	Government	Herd	Test
2nd „ „	1917	„	1919	„	„	„
3rd Herd	1920			„	„	„

All Competitors have been bred by owner for generations

Breeder of Jessie 6th of Melrose, only cow twice Champion under Government Herd Test Regulations, 541½ lbs. butter fat; Rarity 8th of Melrose, Champion Cow of Australia, with 718¾ lbs. butter fat in 273 days, 40 lbs. milk on last day of test; First Choice of Melrose, Sire of 1st Prize Herd, 1919

Young Bulls from Large Producing Cows for Sale

W. WOODMASON, "Melrose," Malvern, Victoria

DEPARTMENT OF AGRICULTURE

Central Research Farm, Werribee

RAMS FOR EARLY FAT LAMB BREEDING

Stud Border Leicester and Suffolk

RAMS

NOW AVAILABLE FOR SETTLERS

Border Leicesters

Rams from Imported Stock, 1 year and 2 years old.

Selected for Flock Owners - - @ **£10 10/-**

Good Flock Rams of above ages - @ from **£6 6/-**

Suffolks

Crosses of this breed have proved to be the earliest fat lambs bred this and other seasons in Victoria. The first pen of 20 lambs for the season realized at Newmarket on 3rd August, **45/7** per head at **16 weeks old.**

Rams from Imported Stock

1 year old—£10 10 0 3 years old—£8 8 0

2 „ „ £10 10 0 4 „ „ £6 6 0

Postal Order or Cheque should accompany order, which should be addressed to

H. C. Wilson, Manager, Research Farm, Werribee

Consign Your Stock
TO
SCARLETT & CO.
NEWMARKET

OUR weekly sales at Newmarket are conducted by Mr. W. E. Phillips, Auctioneer, who personally supervises all classing, drafting, and selling of stock.

Our Land Department is under the management of a Sworn Valuator and, having properties in all good districts of Victoria and Riverina, we will not waste your time with impossible propositions.

Our Jute Department co-operates with the producer. We sell Bags, Twine, Oils, &c., direct to the farmer.

Our Grain Department will buy your products, or sell on your account at top market prices.

IL595

BLUE BIRD BRAND

SCARLETT & Co

Cr MARKET & COLLINS Sts MELBOURNE

NATIONAL TRUSTEES

Executors & Agency Company of Australasia Ltd.

DIRECTORS:

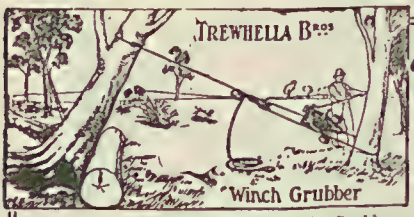
HON. WALTER MADDEN, Chairman and Managing Director.
EDWARD FITZGERALD, Esq., LL.D. MICHAEL MORNANE, Esq. H. V. McKAY, Esq., C.B.E.
HENRY MADDEN, Esq. Brigadier-General H. E. ELLIOTT, C.B., C.M.G., D.S.O., D.C.M.

This Company Acts as Executor or Joint Executor of Wills, Administrator, Trustee of Settlements, and Agent for Absentees under Power of Attorney.

MONEY TO LEND ON BROAD ACRES AND FARM LANDS.

Offices—113 Queen St. (Corner of Little Collins-st.), Melbourne

J. H. MACOBOY, Assistant Manager. *HON. WALTER MADDEN, Managing Director.*



"1000 TREES & STUMPS GRUBBED OUT"——

Thus writes Mr. J. Sutherland, Parwan.

"I am very well pleased with the Grubbers, as they are doing very good work. With mine I have close on 1,000 trees and stumps grubbed out. I have done all this work myself without any assistance. So I consider the Grubber has more than doubly paid for itself."

Full particulars from—

The "MONKEY WINCH" will save time, labour and money on your land clearing, is always ready, and can be worked in the very roughest country and in any class of timber.

TREWHELLA BROS. PTY. LTD., TRENTHAM

52% —— FRENCH —— 58%

MURIATE OF POTASH

NOW AVAILABLE

AUSTRALIAN SOILS NEED THE ADDITION OF POTASH

Full particulars from

DALGETY & CO. LTD., MELBOURNE

And all Branches. **Sole Agents for the Commonwealth.**

DEPARTMENT OF AGRICULTURE, VICTORIA

NOW AVAILABLE

Handbook of Potato Diseases in Australia—and their Treatment

BY D. McALPINE,
GOVERNMENT VEGETABLE PATHOLOGIST.

With Appendices by W. Laidlaw, B.Sc. (Biologist), on **Eel Worms;** and C. French, Jnr. (Government Entomologist), on **Insect Pests of the Potato.**

235 Pages (Cloth). 176 Illustrations. 58 Full Plates. **Price, 5/-** Postage: Commonwealth, 2d.; New Zealand, 8d.; British and Foreign, 1/4.

Applications accompanied by Postal Note or Cheque, covering Price and Postage, to be forwarded to **The Director of Agriculture, Melbourne, Victoria.** Remittances from beyond the Commonwealth to be made by Post Office Order.

THE USE OF SICKLE BRAND FLORIDA SUPER

FLORIDA SUPER — SICKLE BRAND — CUMING SMITH & Co

ENSURES INCREASED RETURNS
TO
FARMERS—GRAZIERS—DAIRYMEN

WHEAT

HEAVIER DRESSINGS OF **90 to 112 lbs.** PER ACRE INCREASE SUBSTANTIALLY THE YIELD OF **WHEAT**

MILK — WOOL

A TOP-DRESSING OF 1 CWT. OR UPWARDS PER ACRE ON PASTURE LAND, INVOLVING AN ANNUAL OUTLAY OF **ONLY A FEW SHILLINGS**, IMPROVES THE QUALITY OF THE GRASS—MAKES CATTLE AND SHEEP MORE HEALTHY—ENABLES THE LAND TO CARRY MORE PER ACRE—RESULTING IN GREATER RETURNS, AS THE CASE MAY BE, OF BOTH **MILK AND WOOL**

WRITE FOR PARTICULARS **CUMING, SMITH & CO. PTY. LTD.**
65 WILLIAM STREET, MELBOURNE

NOXIOUS WEEDS

FARMERS—don't let the weeds get a first mortgage on your land. The Most Effective, Safest, and Cheapest Method of ERADICATING WEED PESTS is by using

"CACTUSENE" A—B—and—C GRADES

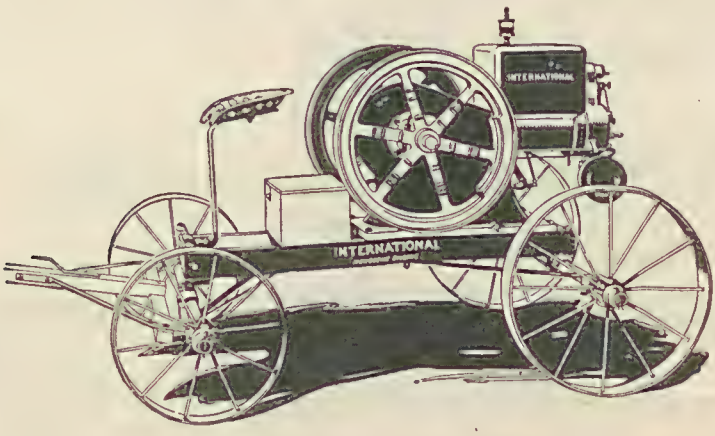
Applied by means of an Atomiser, as shown below

Easiest Method of Killing
BLACKBERRY,
CALIFORNIAN THISTLE,
BATHURST BURR,
ST. JOHN'S WORT,
SWEET BRIAR.

Easiest Method of Killing
CACTUS,
LANTANA,
RAGWORT,
STINKWORT,
BOX THORN.

RECOMMENDED BY THE DEPARTMENT OF AGRICULTURE OF VICTORIA
We have hundreds of Testimonials from satisfied clients.

Manufactured by **CACTUS ESTATES LTD.,** 60 QUEEN ST. MELBOURNE



A Size to Meet Your Needs

Long ago engine power made a secure place for itself on the *good* farmer's farm. Made itself the indispensable worker at a dozen or more small jobs we need not name here. You know them too well. They are part of the routine of your life.

Thousands of power users will tell you if they have the opportunity that the best answer is **"International Kerosene Engine!"** On the day you read this ad many new Internationals will start work for new owners. These engine investments are made on the strength of rugged IHC reputation, kerosene economy, quality of materials and construction. And you have the sureness of International service at your call whenever you have need for it.

International engines are made in 1½, 3, 6 and 10-h.p. sizes. One or another of them will serve you. See the IHC local agent or write us direct.

International Harvester Company of Australia Pty. Ltd.

543-555 Bourke Street, Melbourne

Agents Everywhere

THE JOURNAL

OF THE

Department of Agriculture

OF

VICTORIA.

Vol. XIX. 21st January, 1921. Part 1.

THE CONTROL OF THE SOURCE OF OUR MILK SUPPLY.*

By W. A. N. Robertson, B.V.Sc., Chief Veterinary Officer.

The ideal milk supply is a pure, not a purified one, and the solution of the problem of attaining anything approaching the ideal demands the thought of every citizen. Scientists may prescribe formulæ, but it will remain for the masses to carry them into effect. The difficulties are centered around the fact that milk is a most suitable field for the growth of so many organisms, and one to which they may gain access with such ease.

The problem can be met only if we remember that contamination may occur at any stage during the progress of the milk from the cow to the consumer, and the last stage is as fraught with danger as the first—in many cases more so.

The purpose of this paper is to point out some of the channels of contamination and the difficulties to be encountered at the source of the supply, and to indicate the methods adopted in Victoria to combat them.

The first point to recognise is that milk when drawn from a healthy cow is practically free from all germ life; it depends upon the number and variety of organisms introduced at subsequent stages, and their rate of growth—dependent upon the temperature at which the milk is held—as to how long it will remain sweet and a suitable article of food.

One may, perhaps, express regret that milk is not transparent, for, owing to its opaqueness, the dirt it contains may be masked, and the old saying that "What the eye does not see the heart does not grieve for" applies very forcibly.

Some of the organisms are, of course, more harmful than others, and the endeavour should be to prevent the harmful ones entering and

* Notes of a lecture delivered under the auspices of the University of Melbourne, 15/12/20.

21258.

to reduce the number of the less injurious. It must, however, be recognised that the striving for cleanliness and search for the last germ may be pushed to a point where it costs more than the benefit it yields is worth.

The principal sources of contamination of milk are:—

1. Dirt and dust.
2. Infection of human origin.
3. Infection of animal origin.

The infection of animal origin, which must be most strictly guarded against, is tuberculosis, a disease communicable to man, and of so insidious a character that its harmful effects are not immediately discerned. The presence of the disease in animals may sometimes be detected by physical examination, as certain changes in the tissue take place, and the symptoms are observable by trained men. There are many cases, however, which cannot be diagnosed save by conducting a special test, known as the tuberculin test. Here, then, the first difficulty in obtaining a healthy herd is met.

There are inflammatory diseases of animal origin capable of producing ailments, such as sore throat, &c., in man. These diseases must be carefully guarded against, as they may actually throw the whole herd of the dairy farmer out of profit.

The diseases of human origin which may contaminate milk are equally hard to control, for the "carrier" on the farm may infect the supply and escape detection until a sufficient number of cases occur from the consumption of milk to make a common source apparent. The dairy farmer who is unfortunate enough to have a case of diphtheria or typhoid fever on his farm is forced to suspend operations until all danger of infection is over.

Dirt and dust, the most common source of contamination, is one which must be fought at every stage. On the farm the principal channels whereby these enemies enter are—

(1) from the atmosphere, which may or may not contain disease-producing germs;
(2) from the body of the cow, through hair, dried mud, fæces, &c.;
(3) from the hands of the milker, his body or clothing, which may or may not have been exposed to infectious diseases;
(4) from dirty and rusty utensils;
(5) from impure water used in washing utensils.

Under commercial conditions, it is impossible to remove all sources of contamination, but every effort must be made to reduce them to as near vanishing point as possible. This can be done by providing for:—

1. *An adequate water supply, to wash sheds and yards and lay the dust.*

   To the man who can turn on the Yan Yean tap, this is not difficult; but without such convenience, and its absence is the rule, the difficulties are great. The quantity which can be stored is limited, and even this requires a heavy outlay. Constant encouragement and occasionally pressure must be given to improve this aspect, and protection

from exposure to dust-laden atmosphere attempted by provision of separate flyproof milk rooms.

2. *The brushing and washing of udder and flanks of milking cows.*

This does not appear difficult, yet hair will fall out; dust and dirt will become attached to the body of the cow when she is lying down; later, while milking is in progress, flies will annoy her, and she will use her tail, and so convey foreign matter to the bucket.

3. *The milkers to wash their hands before milking each cow.*

They should also have clean clothes or overalls. The human element is the weak link here, for to walk to another part of the shed to reach the washing outfit means delay, and in the absence of the supervisor or the owner of the herd, the rule may be more honoured by the employee in the breach than in the observance.

4. *The utensils to be clean and in good repair.*

Dirty and rusty utensils are large factors in the contamination of milk. They are common to both the farm and the home, probably more in the latter than the former. The blame for milk going sour must not always be given to the milkman, for the purest of milk could not keep sweet in some of the utensils, very improperly washed, which are provided by the consumer.

The expense of maintaining utensils on the farm is heavy. Milk cans do not have a long life, many are lost in transit, and the farmer requires four to six times as many as are necessary for one day's supply.

5. *The cooling of milk on the farm, as far as possible, to prevent the growth of organisms which have gained access thereto.*

Water cooling has to be resorted to. While this is not ideal, the cost of installation of refrigerating plants on dairy farms, save only on large properties, is prohibitive. A recent decision of the Government, which will go far to improve this aspect of the matter, is that all milk entering the metropolitan milk area must be chilled immediately, and that special shops and dairies will be approved for the purpose of providing an infants' supply.

To efficiently carry out all the details necessary for a pure milk supply requires the expenditure of much time, trouble, and money.

How, now, is the farmer rewarded?

Milk is probably the only food which is not sold, save in isolated instances, according to its quality. The dairy farmer who is prepared to devote time and expense in providing a good, clean milk, has to compete with the careless man who sells dirty produce. Too many householders will go to the little shop round the corner, or to the illicit seller, because the milk is a halfpenny or a penny per pint cheaper.

Most produce of the farm gives visible evidence of its quality, and the householder is prepared to, and does, pay higher prices for the best grades of butter, fruit, vegetables—even eggs are graded into new-laid,

and "just eggs," and a differential price paid; but with milk, the majority believe in paying for "just milk."

Sanitation costs money, and the difficulties of producing top grade milk will be largely overcome when it is recognised that the farmer who devotes money and constant attention to his business in an endeavour to produce a prime article, and who, perhaps, has to bear the loss of one or more condemned cows, is worthy of recompense.

An effort is made to provide a pure milk supply in Victoria under the provisions of the Dairy Supervision Act. Prior to 1906, the inspection of dairies and dairy farms was undertaken to a greater or less extent by municipal councils under power conferred by the Health Act. The system, or rather want of system, was a complete failure. There was no guiding authority, and the conditions under which milk was produced were, in many instances, appalling.

In 1906, the Dairy Supervision Act became law, and a new administrative body created in the Dairy Supervision Branch of the Department of Agriculture. It was recognised that the problem could better be faced by adopting an educational system as opposed to the hard-and-fast inspectorial system of the sanitarian, and by having officers independent of local influence.

The Act provides, in the first place, for the creation of what are known as milk areas, by which an efficient system of inspection of all dairies and dairy farms, wherever situate, supplying milk for consumption within such area, may be maintained. The Melbourne milk area has, first, the geographical boundary of Melbourne and its suburbs, but it also includes all dairy farms from which milk is sent into the area; so that, if milk comes from a farm 100 miles away, such farm is part of the Melbourne milk area.

The next provision was for the creation of municipal districts, within which all dairy farms are subject to Government supervision; but dairy farms outside the geographical boundary of a municipal district do not come within the provisions of the Act—unless the municipality in which they are situated has been proclaimed under the Act—even though milk from such farms be sent into a municipal district under the Act.

The effect of the creation of milk areas was to bring the majority of farms in adjoining municipal districts within the area, and thus few premises were left for supervision in and inspection by municipal officers. The municipal councils concerned therefore asked that the provisions of the Act should be extended to the whole district; and as councils still further remote witnessed the benefits of Government supervision, the scope of the Act was gradually extended by the voluntary acts of certain municipalities, until now practically one-third of the State is under control, and consideration is being given to proclaiming the Act over the whole State.

The system followed was an educational one, so the old title "Inspector" was abandoned for that of "Supervisor." These officers are selected after examination from men who know the business of dairy farming thoroughly and have a sound knowledge of sanitation. They command the respect of all dairy farmers, and are looked on as friends rather than with the disdain attaching to the old-time inspector.

At first only twelve Supervisors were required; but, as the area extended, additions to the staff became necessary, and now 52 are employed. Each Supervisor has a district assigned to him annually, and his duties are to familiarize himself with every farm and farmer, and to encourage improved methods of management. Authority is not exercised except in such cases as will not respond to education.

In milk areas at least four inspections per annum are required, while in municipal districts two are looked for. A report is made of every visit, the first of every year being a complete description of the conditions prevailing. There are no hard-and-fast regulations—often impossible to enforce—in respect of buildings; every case is dealt with on its merits, and improvements have been steadily carried out. A requirement insisted on is that the floor of the shed and dairy shall be impervious to water, and have suitable drainage.

Supervisors are required to know the appearance of a healthy cow, and to be able to detect any departure from the standard, but not necessarily to know the cause of such departure. They are all specially trained so as to be able to conduct a physical examination of cattle, and every cow on farms they inspect is examined. Should any cow show symptoms suggestive of disease, the Supervisor prohibits the use of such animal for the production of produce for sale for a period of fourteen days, and makes a special report. Within the fourteen days, or as soon after as possible, a veterinary officer—of which there are several in the Department—visits and examines suspicious cases. He has the power to remove the prohibition if the ailment has been a passing one and the animal has recovered; or he may extend it for any period thought necessary during which the tuberculin, or any other test, may be applied; or he may, if satisfied that the milk is injurious, and will remain so, make the prohibition permanent, in which case the cow is branded with a broad arrow, and killed in due course.

At the same time as the inspection of suspicious cases is made, the veterinary officer checks the examination of other members of the herd, and also the recommendations of the Supervisor from a sanitary aspect, either stiffening or relaxing them as necessary.

Since the inception of the Dairy Supervision Act, 5,604 cows have been permanently prohibited by veterinary officers. Of this number, 2,267 were affected with tuberculosis. The most dangerous form of this disease is that in which the udder is affected, for then the milk is bound to be infected.

In the first year of supervision (1906-7), a large amount of udder tubercle was detected; the percentage of such cases to the total affected was 71.8 per cent. Last year only 25 cows were found so affected, and the percentage was 11.5. This shows a decrease in the amount of detectable udder tuberculosis in thirteen years of approximately 80 per cent. The effect of this upon the health of the community cannot be estimated; but that many of the rising generation will live to lead useful lives in the community, who would otherwise have been sacrificed to this dread disease, is undoubted, and some measure of the success in the saving of infant life from diarrhœa and wasting diseases, which has occurred during recent years, must stand as a firm foundation for a monument to the efficacy of our Dairy Supervision Act.

During the years 1910 to 1913, a means was at hand of ascertaining indirectly what the elimination of so much udder tuberculosis had achieved. For this period, Meat Inspectors under the Board of Public Health were present at each bacon factory throughout the State, and every pig killed was subjected to careful examination. Statistics were kept as to the districts from which the pigs came, and the percentage affected with tuberculosis from each district was determined.

It must be remembered that not every district was subject to dairy supervision, so a contrast could be obtained between tubercle in pigs fed on milk in dairy supervision districts and that in pigs fed with milk in non-supervision districts. The result was striking—

100,136 pigs from supervision districts showed 4.06 per cent. affected.

156,730 pigs from non-supervision districts showed 13.76 per cent. affected.

The lesson is obvious. Since the primary channel for the spread of tuberculosis in pigs is skim milk, it is evident that milk from dairy supervision areas is practically free from tubercle bacilli, for it must be remembered that inspection in milk areas is more constant than in municipal districts; therefore, the supply to such areas should be even more free than is indicated by the figures quoted above.

It may therefore be reasonably claimed that good work is being done; but this must not be an excuse for resting—further improvements is necessary.

HOW GERMANY DEALS WITH POTATO GLUTS.

The September issue of *Chambers' Journal* contains an interesting article which explains how the problem of dealing with the glut of potatoes has been solved in Germany, where 54,000,000 tons are raised annually. Owing to the low prices offered for potatoes, the agrarian interests were forced to attack the question from motives of self-preservation. The successful drying of beet pulp after the sugar has been extracted, thereby enabling the material to be kept indefinitely for stock-feeding purposes, suggested an examination of the feasibility of applying similar methods to the potato. These investigations were carried out, and as a result two simple methods were evolved, perfected, and brought into operation. It was quickly found that drying did not adversely affect the composition of the potato, and that the dried tuber, besides being valuable stock food, was a first-class raw material for products such as starch, "farina," glucose, dextrine, alcohol, &c. Before the war fully 500 potato-drying factories were established. The outlook was improved by the new process, evolved by an English inventor, the salient characteristic of which is its variability, which permits one or other product being exploited according to the conditions of the market. This will tend to steady the price paid to the farmer for the raw material, and encourage him to devote increased attention to the cultivation of the potato, and to improve the yield by raising more prolific varieties by having more liberal recourse to fertilizing.

PEACH GROWING IN VICTORIA.

By A. G. McCalman, Orchard Supervisor.

The Peach (*Amygdalus persica*) and its smooth-skinned sport, the Nectarine, are two of the choicest of cultivated fruits. The peach tree probably originated in China, but early in the Christian era it was brought to Europe, and it is now grown in most temperate climates.

In Victoria, the peach is quickly becoming one of the leading fruits; in the irrigation areas of the northern districts it is being planted more extensively than any other fruit, the rapidity of its growth, and the comparatively early age at which it comes into profitable bearing making it most suitable for growers of small means. Added to this is the fact that prices in recent years have been highly remunerative. Clingstone peaches suitable for canning have latterly been most extensively planted in the Goulburn Valley districts under closer settlement; but a large area is also under dessert varieties for supplying the Melbourne and Sydney markets.

The peach-grower, unlike the apricot-grower, can plant varieties which will give a succession of fruit ripening over at least four months. For instance, in an area planted with the following canning varieties, Leader, Tuscan, Phillips, Goodman's Choice, Golden Queen, and Pullar's Cling, there would be fruit coming in from, say, the end of November till the middle of March. If an orchard be planted with such varieties, it is not necessary for the grower to hire a number of pickers for a few weeks or less; and in many cases all the harvesting of the fruit can be done by the grower and his family.

I. Soils.

Care must be taken in the selection of soils for the peach. Good drainage is essential, and the subsoil should be examined in various parts of the block before deciding to plant. In the irrigation areas around Shepparton, Ardmona, Lancaster, and Tongala, the nature of the subsoil often varies considerably in a short distance. Generally speaking, the most suitable soil in these districts consists of a sandy loam varying from 9 to 18 inches in depth, overlying a friable red clay intermixed with sand particles, while under the clay lies a yellow silt which allows water from rain or irrigation to soak through readily, thus giving natural under-drainage.

A soil frequently met with in these districts consists of a heavy loam from 5 to 6 inches deep overlying a rather retentive clay, which prevents water from percolating freely to the silt below. Such land is generally what is known locally as "crab-holey". In it there are numerous slight depressions, not noticeable until after heavy rain or the flooding of the land with irrigation waters. The depressions will then be very apparent, owing to the water lodging in them for several days, the subsoil allowing it to soak away only very slowly. Such land is much more costly to cultivate than the free sandy loams, the growth of the trees on it being slower and the yields lower. Virgin country of this nature will, however, grow peaches well; but will be bettered by liming, and by the ploughing in of green cover crops to improve the mechanical condition of the soil. But if the land has been under farm crops for

a number of years, it must be classed as unsuitable, as the clay will have become compacted by frequent ploughing and the trampling of horse teams, and the humus or vegetable matter greatly depleted. It may, of course, be improved by liming and the ploughing in of deep-rooted cover crops; but it is inadvisable to plant peach trees in land not naturally adapted for them.

The peach does well on the deep sand, such as is found in the sand-hills along the banks of the Goulburn and Murray Rivers. Early ripening varieties are suitable for this class of soil, as the fruit ripens earlier in sandy country than on other soils, and the grower gets the benefits of the higher prices ruling when peaches just appear on the market. Experienced growers in the northern irrigation areas look for land with a friable top-soil, at least 9 inches deep, over a friable clay, and having a very slight fall, so that when irrigating, the water will run gently along the furrows.

Fig. 1.—An Irrigated Peach Orchard—Fyansford, near Geelong.

II. Situation.

In hilly country a northerly and easterly aspect is to be preferred, especially in the cooler districts. Shelter from the cold south and west winds is a great advantage. In the northern irrigation areas no choice of aspect is available except in the matter of shelter by timber. Formerly, growers in these districts planted breakwinds of sugar-gums, pepper trees or other quick-growing trees, but this is seldom done now. Such breakwinds take up a lot of space and render trees planted within a chain of them unprofitable. Almonds have been found unsuitable as breakwinds; they are easily killed by an excess of water, and are very subject to attack by red-spider (Bryobia mite).

The tree now favoured for planting on the south and west boundaries is the William's Pear. These are upright and fairly rapid growers, and require less attention than peaches; planted 10 to 12 feet apart they make a fairly efficient breakwind, besides returning a handsome profit for the land they take up.

In very windy districts, such as that about Geelong, the tree most favoured as a breakwind is the pine (*Pinus insignis*). These trees are rapid growers, and in a few years give effective protection. Peaches should not be planted within a chain of a pine break, as the roots of the pines are great robbers, and the trees would die out in most cases before returning a profitable crop.

If the site of a peach orchard adjoins a dusty road it is advisable to plant three or four rows of pears or other smooth skinned fruit next to the road, in order to help to keep dust off the peaches. The fruit of the peach is covered with fine hairs and these collect the dust, rendering the fruit unsightly.

On free soils it is not advisable to plant peaches close to an irrigation channel, such as a permanent head-ditch or the main supply channel, as the trees are liable to be killed by constant seepage of water. Pears are the most suitable trees for such positions, as they will thrive in a soil which would be too wet for stone fruits.

III. Preparation of Land.

The land should be thoroughly cleared of native timber, the stumps being burned or grubbed out, or blown out by explosives, and, as far as possible, all roots removed. After the first autumn rains the ground should be ploughed about 8 inches deep, or if the top-soil be shallow, as deep as possible without turning up the clay. It should then be thoroughly worked down with a scarifier or disc cultivator.

Where irrigation is to be practised and the land contains slight depressions, these should be filled in with a grading implement by scraping into the depressions the surface of the higher ground adjoining.

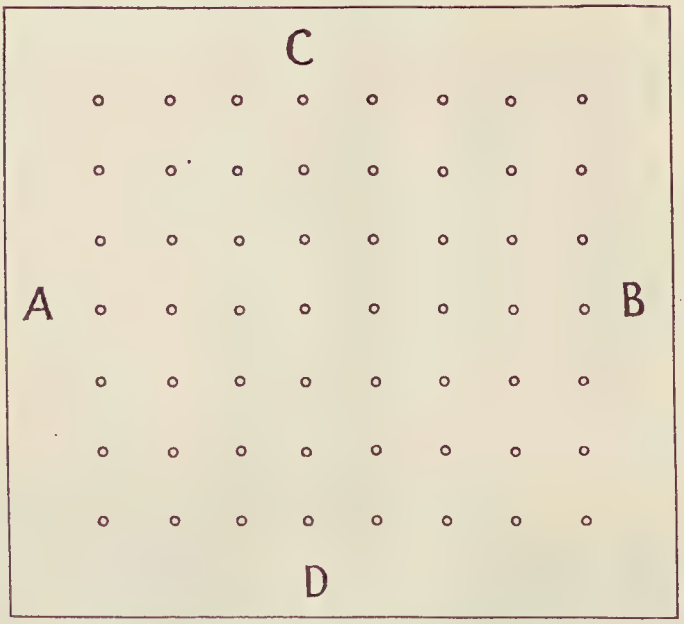
A second ploughing should then be given in order to increase the depth of the worked surface where the soil has been scraped off in filling the depressions. The importance of this levelling is often only recognised after the trees have been planted and attempts are being made to irrigate them. The grower who has neglected to level the land then finds that the water floods into the depressions in spite of his efforts to confine it to the furrows, and that if water is to be given to all the trees some will get too much. This ground will dry unevenly, and the grower will not be able to get on with the cultivation until the water has evaporated from the whole area. Well levelled land saves water and an immense amount of work, and gives much better results in the health and growth of the trees.

The land must be securely fenced against stock, and should be wire-netted to prevent hares and rabbits injuring the bark or young shoots.

IV. Planting.

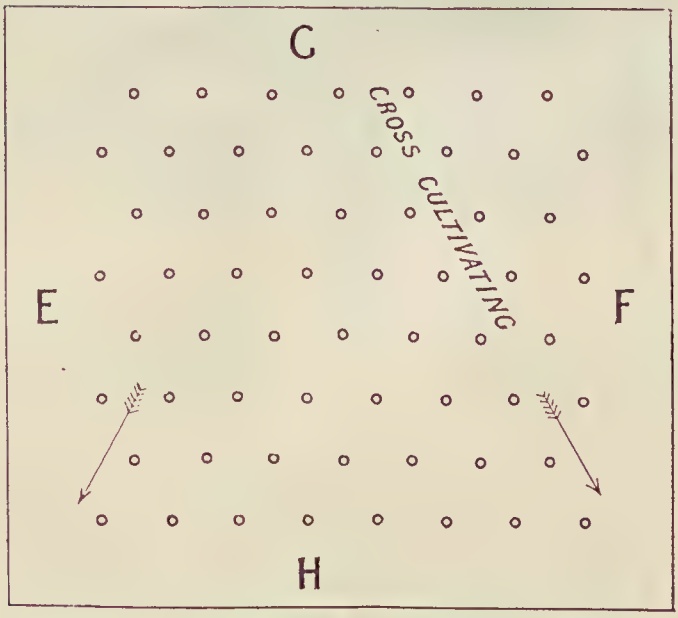
Peach trees are generally planted 18 feet apart, but 20 feet is preferred by many; if planted on the square system, the former distance gives 135 trees to the acre and the latter 108.

The former practice of planting on the septuple system has generally been discarded. With septuple planting each tree is equi-distant from each of the six trees surrounding it, and more trees are planted to the acre, but the extra labour involved in cultivating and irrigating with this method far outweighs any advantage. Figure 2 shows the



— SQUARE SYSTEM —

Fig. 2.



— SEPTUPLE SYSTEM —

Fig. 3.

square system of planting, and Figure 3 the septuple. In the case of trees planted on the square system (Figure 2) they would be 20 feet apart, and thus there are 20 feet lanes for cultivating from *A* to *B* and *C* to *D*. On the other hand with the septuple system (Figure 3) the lanes from *E* to *F* are 17 ft. 4 in. wide, and those running at right angles from *G* to *H* only 10 feet, so that cross cultivating must be done along the lanes shown with arrows, and these run out into awkward corners.

The following method may be employed on fairly level ground for getting the correct position of the trees. If a rectangular piece of land is to be planted, stretch a length of No. 10 fencing-wire parallel to the fence on one of the longer sides, about 15 feet from the fence, as shown in Figure 4, *A*.

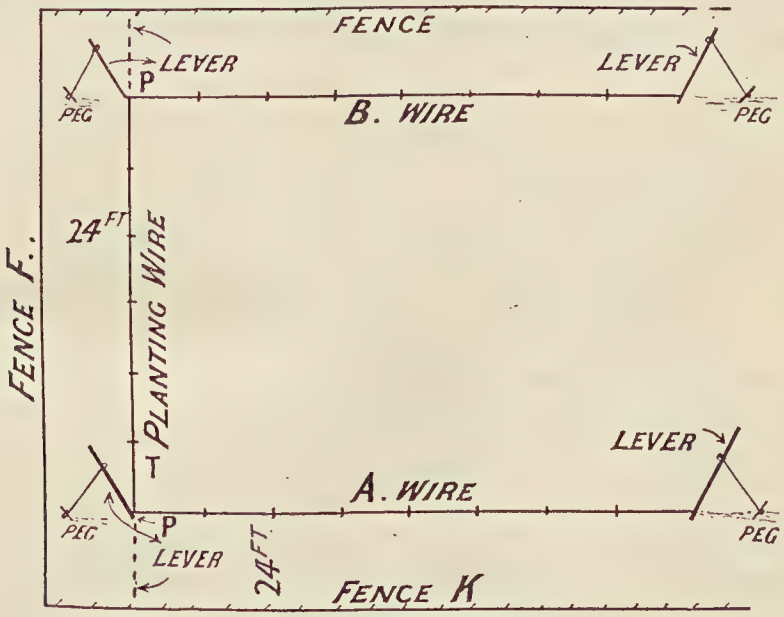


Fig. 4.—Method of Planting.

Parallel to this stretch another wire, *B*, about 15 feet from the fence on the opposite side. These are stretched tight by fastening the ends to long poles the lower ends of which are placed in a hole in the ground about 9 inches deep, the wires being fastened about a foot above the ground level. These poles or levers are then drawn back so as to stretch the wire tight, and held in position by ropes tied to the upper ends, and to pegs driven into the ground behind. The holes are then filled in to prevent the levers from moving. These wires remain in position until the field is planted. Now measure 24 feet from fence *F* in line with wire *A*, or the distance intended for a headland, and mark the place with a peg *P* against wire *A*. Place a dab of tar on wire at this spot and tie a piece of hay-band over the tar.

Measure 20 feet, or whatever distance the trees are to be planted apart, along the wire and mark again with tar and hay-band, and

so on until the wire is marked for the whole length. The tar is to prevent the tie from slipping. Mark wire *B* in a similar way.

A temporary wire called the planting wire is now stretched at right-angles to wires *A* and *B*, so that it will be exactly over the marks *P P* on wires *A* and *B*. Measure 24 feet (or width intended for headland) from fence *K*, and mark the place *T* on planting wire with hay-band, and continue to mark off planting wire from mark *T* at 20-feet intervals, as was done on wires *A* and *B*. Now place three or four sight poles, provided with slots, along planting wire in line between points *P* and *P*. By lifting the planting wire into these slots it will be held about 9 inches above the ground. A start may now be made to plant. Place the butt of the first tree against mark *T* on planting wire, and continue planting at marks along this wire till the row is completed. Then remove planting wire to the next marks on wires *A* and *B*, and plant another row, and so on, until the work is finished.

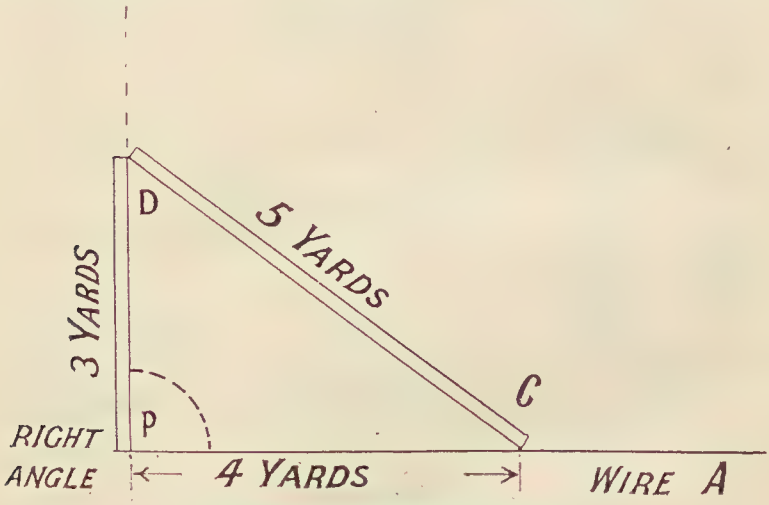


Fig. 5.—Method of Finding Right Angle.

The planting wire is stretched tight with levers in the same way as the wires *A* and *B*. The holes to take the ends of the levers should be sunk about 2 feet behind the marks on the wires *A* and *B*, before planting is started. Before moving the planting wire for the first time a mark should be placed on it exactly over marks *P* and *P* on the permanent wires *A* and *B* so as to get the correct position for planting wire each time it is moved. It takes a few hours to make these preparations, but once completed the work of planting can go on very rapidly, and the trees will be in the correct positions.

If the fence *F* be not at right-angles to fence *K* a right angle may be obtained as follows:—Measure 4 yards from mark *P* and mark the place on wire *A* at *C* (Figure 5). Now take two battens 5 and 3 yards long respectively. Place one end of the shorter at point *P*, and an end of the longer one at point *C*. Hold these in position while an assistant brings the other ends together. At the point

where they meet put in a peg *D*. A line drawn from *P* to *D* is at right-angles to the wire *A*. A line is then obtained by putting up sight poles at *P* and *D*, and getting these in line with a pole at the far side of the field.

When the trees are received from the nursery the bundles should be opened out as soon as possible, and the trees "heeled in" in a piece of friable soil. This is done by making a trench about a foot in width, and 6 or 7 inches deep, placing the soil removed along one side of the trench to form a bank. The trees are placed with the roots in the trench and the tops resting on the bank; they should be put close together so as to save space. A fresh trench is dug in front of this, and the soil broken up and thrown over the roots and shaken well in, so as to completely cover them. Another lot of trees is placed in the new trench and covered as before, and so on until the work is completed. If the ground be dry it should be watered. If the ground be too wet for heeling the trees in when they arrive they may be placed in water for a day or two.

Before planting the trees should be submerged for about 8 hours in tobacco water previously prepared for the purpose; the object of this is to destroy any peach aphis which may be harbouring on the roots or other parts of the trees. Prepare the tobacco water by soaking 1 lb. of leaf tobacco, or failing this 4 lbs. of tobacco stems, for a week or longer, to every 4 gallons of water. If required in a hurry use boiling water and steep for 48 hours. Three lots of trees may be soaked in the one receptacle in the day.

Planting may be carried out at any time during the winter, if the ground be moist and not so wet as to be sticky. Holes should be dug about 8 inches deep, and wide enough to readily admit the roots. The roots must be carefully trimmed with a sharp pair of secateurs before planting. Cut off all injured roots above the bruised place, making the cut on large roots so that it will be parallel with the ground when the young tree is planted. Shorten the larger roots to a length of from 4 to 6 inches, and if two roots are twisted together remove one completely. The bundles of trees when removed from the place where they have been "heeled in" should be kept covered by a wet bag as planting proceeds, to prevent them from becoming dried by sun and wind.

In planting a tree, place a shovelful of well-broken-up top-soil in the hole, so as to form a rough pyramid; place the tree in the hole in position, and throw in a few shovelfuls of finely broken soil; slightly lift and shake the tree, so that the soil will sift well round the roots and trample it down, while holding the tree in position, so as to drive out the air and make the tree firm. Add more soil till the hole is filled a little above the surface level to allow for sinking. The tree should be planted so that it will be about the same depth in the ground as it was in the nursery. The place where the bud was inserted in the seedling by the nurseryman should show above the ground.

The tree should be planted so that the strongest limb points towards the south-west, with the trunk slightly inclined in that direction; the cold winds from the south-west check the growth on that side, and a more even head will be obtained by planting as described.

If early ripening varieties are planted in an irrigated orchard these are preferably placed on the highest portion of the block, as this is usually the most troublesome portion to water, and the early ripening kinds require fewer waterings than the later ones.

Fig. 6.—Method of Laying Out Block.

Figure 6 shows a desirable method of laying out a block. The cross-ditch B will not usually be required unless the number of trees in a row between A and B exceeds 60.

Should there be low ground between ditches A and B, even if the distance be short, the cross-ditch B will be needed as the water

will have to be brought along ditch C, and then supplied to the rest of the block from ditch B, which will supply the trees on the high ground on both sides. Assuming, as in the plan, that cross-ditch B is not required, the earliest varieties could be planted right across the block, the next earliest adjoining them, and so on. If ditch B is required, it would be better to plant the early kinds on the west of the ditch, treating the two sections as separate blocks.

A breakwind of pears on the south and west sides of the block is shown here. These may be planted close to the ditch, say 6 feet away, with 12 feet between the trees. A double row of pears makes a more effective breakwind, and the second row should have the trees planted opposite the centre of the space between those of the first row and about 15 feet away. Between the pears and the first line of peaches 24 feet should be left as a headland, and a similar width of headland should be left on the east and north.

If the block has not been wire-netted it is very necessary to take precautions to guard the young trees by other means from injury by hares and rabbits. Newspaper wrapped round the butts is an effective protection for them, but leaves the limbs exposed. These may be protected by painting them with a mixture of 4 lb. of lime and 1 lb. of sulphur made into a paint with water. Another method is to paint them occasionally with blood, obtainable from any slaughter-yards.

On no account should the trees be left unprotected. Even if hares and rabbits are not plentiful in any district, it must not be forgotten that only one of these pests is capable of destroying a number of trees in a night. Older trees are not so liable to attack.

V. Guarding against Leaf Curl.

Before the young trees come into leaf in the spring they must be thoroughly sprayed to prevent an attack of curl-leaf fungus (*Exoascus deformans*). The following mixture will be found effective, and should be applied when the buds are swelling, about the second week in August:—Dissolve 1 lb. of bluestone in ½ a gallon of boiling water in an earthenware or wooden vessel. The bluestone should be crushed and added to the water and stirred till dissolved. Then add sufficient cold water to make the total quantity 4½ gallons. In another vessel dissolve 1½ lb. of washing soda in 4½ gallons. Pour the two solutions simultaneously into a third wooden vessel and stir thoroughly. This is called the copper-soda mixture and should be used the day it is mixed. The bluestone and soda solutions should be cold before being mixed. Curl-leaf will almost invariably attack the trees unless they have been sprayed at the proper time with an effective mixture, and will cause an immense amount of injury. Like dipping the trees for peach aphis and protecting from rabbits and hares, it is work that no experienced grower will neglect, and one which the inexperienced can ill afford to omit.

VI. Cultivation.

Frequent stirrings of the soil by means of cultivators, by hand hoeing and ploughing, are essential to successful peach growing.

In September the ground between the rows should be thoroughly broken up by means of a spring-toothed or other cultivator or disc harrow, and the soil close around the trees well hoed. If heavy rain follows, the work should be repeated before the soil has become hard and caked. Throughout the spring and summer these operations should be repeated as often as necessary to keep the soil loose. This frequent stirring of the soil is especially necessary in warm districts, as the loose surface soil acts as a mulch, preventing the rapid escape of moisture and keeping the soil cool. Where irrigation is practised, thorough cultivation should follow the watering as soon as the soil has dried sufficiently to take the machines. In the autumn the ground should be ploughed to a depth of about 5 inches; the soil should be thrown up to the trees, and the operation finished in the centre of the rows.

The plough must be set a little shallower when marking out along the rows, so as to prevent injury to the roots. In the spring, before the soil gets hard, the ground should be ploughed back so as to bring it level again. By using a wide rack on the plough, the horse can be kept well away from the trees when ploughing close to them, thus obviating the danger of injuring them by scraping them with the chain or swing-bar. A special orchard plough with a wide rack and movable handles will be found useful for working next the trees, and special orchard harness which does away with the clumsy chains and swing-bars is also obtainable.

Where irrigation is practised the orchard should be ploughed in one direction only, and that in the direction in which the irrigation furrows are run. Cross-ploughing causes bumps and hollows which will give trouble when water is being applied. If the trees be properly shaped, and a good orchard plough used, only a narrow strip along the rows of trees need be left unploughed, and this can easily be worked down with a disc cultivator. After the spring ploughing, the ground in the northern irrigated orchards is frequently left in the rough state until the first watering is given towards the end of October. This watering is done by flooding, the water being run down the central furrows. The water soaks very readily through the rough soil, and if the ground be sufficiently even and level, a good soaking can be given to the trees without the necessity of breaking the soil up fine and running out irrigation furrows.

If this method be not adopted, the plough should be followed by the disc cultivator or ordinary cultivator, and well broken down before the clods become too hard. If the spring ploughing be left too late, or dry weather sets in early, the land sometimes becomes too hard to plough. In that case, it should be flooded if possible, and then cultivated before ploughing, the object of this being to keep the ground moist for the plough. With heavy soils, it is not advisable to use the disc cultivator late in the summer, as it grinds the soil too fine, with the result that the autumn rains cause it to run together into a solid cake, which is troublesome to break up if dry weather follows. In the autumn the ground should be ploughed up to the trees, the finish being in the centre of each row, and the soil left in the rough until the spring.

(*To be continued.*)

DAIRY TYPE IN BULLS.

By J. S. McFadzean, Senior Dairy Supervisor.

As it is much more easy to grasp the points of a subject with the assistance of a demonstration or illustration than by means of description alone, some photographs of typical dairy bulls are here given, and also some of types which are undesirable for dairy use. With these illustrations some descriptive matter relating thereto is also printed so that a study of the whole may give an idea of what type of animal should be chosen for a dairy sire.

The head of a dairy bull is usually a fair guide to what is behind it, for a typical head is never seen on anything but a well-selected animal. The horns should not be heavy, for the rest of the bone—particularly in shoulder, back, and tail—will usually be found to correspond in

I.—Good Types of Bulls.

(1) Milking Shorthorn.

quality with the horns; and heifers sired by a coarse-boned bull more usually run to beef than milk. Fine horns, fine skin, soft hair, broad and deep muzzle, with large, bright eye and alert expression, all combine to make the typical appearance of a dairy sire's head.

The neck should be masculine without being unduly heavy; that is, fairly strong in proportion to the size of the animal, sloping gracefully from the head into the broad flat shoulder blades on each side, the narrow wither at top, and the lean brisket below. The back should be straight, with ribs well sprung, but not heavily fleshed, the body both broad and deep throughout. With the dairy cow the big, shapely, and well carried body indicates strong constitution and ability to utilize a large quantity of food, as is highly essential for heavy milk production;

I.—Good Types of Bulls.

(2) Friesian.

(3) Red Poll.

I.—Good Types of Bulls.

(4) Ayrshire.

(5) Jersey.

II.—Inferior Types of Bulls.

(1) Bull of Ayrshire Breeding,

(2) A Mongrel Bull,

II.—Inferior Types of Bulls.

(3) Another Mongrel Bull.

(4) A Bad Specimen.

and, as a sire of dairy stock, the bull should be chosen with good development in this section.

The hips should be wide across the top, with lean, flat blade bone, good breadth between the front and rear projecting bones on each side, with the front ones standing out level with the backbone. The backbone, carrying level through from shoulder, should finish off squarely and neatly into the tail, allowing it to hang straight down between the hocks, where it is set off with a neat switch of fine-quality hair.

The rudimentary teats should be well shaped and wide apart, and the escutcheon should show out clear on each thigh. Both the shape and placing of these teats should be given special attention, as these features in the sire will be largely reproduced in his heifers.

II.—Inferior Types of Bulls.

5. A Bull with Some Ayrshire Breeding.

The shank bones should be lean and fine in quality, showing no thickness towards fetlock, but running out to a neat hoof; while the hair on the whole of the skin should be soft—the hide handling supple, and free from flesh or fat.

With the dual-purpose cattle the frame and bone will be much larger than in the special dairy breeds; but, irrespective of size or breed, the dairy sire should be active in movement, fine in hair, proportionately fine in bone, with alert and graceful carriage, yet showing full masculine strength—all of which features are represented in the photographs of pure-bred Milking Shorthorn, Friesian, Red Poll, Ayrshire, and Jersey bulls now reproduced.

On the other hand, very seldom do we find a coarse, weighty bull amongst the sires of true dairy stock, this type of bull generally being

sluggish of movement and quick to fatten. But it is not in choosing between bulls bred specially for either milk or beef production that mistakes are likely to occur, for such stock are widely apart in their respective conformation; it is amongst bulls which show something of each type that a mistake is apt to be made.

On page 20 is shown a very deceptive animal of Ayrshire breeding, and one which would be likely to find ready sale amongst those who had not studied dairy type closely. This bull is smart looking, and level on top; but is coarse in horns, neck, and shoulder; high on leg; short and thick in tail; narrow between hip bones, and narrow and tight in barrel, looking rather as if intended for fast travelling and jumping fences than for dairy work.

The next picture (No. 2) shows a mongrel bull, somewhat roach-backed, flat ribbed, with thick stubby horns, heavy in shoulder and neck, very narrow and tight in barrel, coarse in feet and joints of legs, thick and drooping in tail, and without any style whatever.

No. 3 is also a mongrel bull, showing Shorthorn colour, fine and clean in shank and tail, but narrow in thigh, tight in barrel, and heavy in neck and shoulder.

Nos. 4 and 5 are other types of mongrel bulls, one showing some Jersey colour, and the other some Ayrshire breeding. The former is broad in hip, but slack in rib and loin, narrow and tight in barrel, and high on leg; the other is slightly roach-backed, small in barrel, narrow in shoulder, and with thick bone, coarse in shank, and high on leg; neither of them has any style or character.

These five bulls are of types all very frequently seen in dairy herds, and all are equally useless for the purpose of raising good dairy heifers. Neither will their progeny be good beef stock, for, as mongrels, they are poor breeding stock for any purpose. It is breeding from this class of bull that has kept hundreds of farmers struggling to make a living, feeding and milking mongrel cattle for about half the return they might otherwise be getting if their stock were bred for dairy work.

Much may be learned from a study of the difference in type between these pure-bred and mongrel bulls as shown in these photographs. It is the good -type bull that throws the good dairy heifers which make dairying profitable, and which bring high prices when offered for sale. Amongst every breed of pure dairy cattle there are high quality bulls obtainable which will throw the right class of stock, and the Government herd test reports show what breeders have this class of cattle. Every year of breeding from a mongrel bull is a year lost out of each dairy farmer's life; so far as progress goes, it is a year absolutely wasted.

A good dairy bull will throw heifers which will test easily 25 per cent. higher than the average dairy stock. Very many of the mongrel cattle of the State do not test over 3.5 per cent. of butter fat, and very many of the pure-bred cattle test 5.5 per cent., which is 57 per cent. better return—or that amount more butter fat from their milk. It costs no more to feed a good testing cow that one testing low, but it means much to the dairy farmer if one gives nearly double the amount of butter fat that the other does.

Every dairy farmer who desires to get the full possible return from his herd should breed from only the very best dairying stock obtainable—good type bulls from tested cows.

LOOK AFTER THE BULL.

By R. T. McKenzie, Dairy Supervisor.

Many dairymen are now giving more consideration to the importance of selecting a good bull for the herd sire. It is equally important to see that he remains a good one. There are cases in which dairymen, after procuring a good, young bull, allow him, through improper treatment, not only to become ugly, but an uncertain breeder.

True, sometimes a young bull will deteriorate no matter what attention is bestowed upon him, but in most cases it is due to neglect. While it is of prime importance that the herd sire should have plenty of exercise (and the want of it is one of the potent factors why so many good ones become ugly, and prove uncertain breeders after they are five or six years old), the practice of allowing the bull to run with the herd cannot be too severely condemned. Not only does this practice militate against his potency as a sire, but in many cases it leads to excessive worry of the cows. Then, again, if the bull has the run of the pasture, the heifers may breed too young, or the cows get in calf at unwanted times. It is also impossible to keep authentic records of service dates. Furthermore, it is dangerous, inasmuch as it allows the natural viciousness of the bull full scope to attack any one crossing the paddock.

In some countries where the weather conditions are severe, and the animal disinclined to take enough exercise, a treadmill has been found necessary; in fact, it has been found advantageous to break the bull to harness, and use him for light teaming work, but under our climatic conditions a special yard adjacent to his stall will allow him to take the necessary exercise. Although a bull arrives at sexual maturity at an early age (about six months), he should not be used so young. Towards the end of his first year a few cows may be served, provided that there is a considerable period between each service. Even as a two-year-old it is not desirable to breed to the bull more than one cow a week. The power of begetting is frequently impaired by too much use of a young bull.

No cow should be served more than once during a period of heat.

If cared for when young, a mature bull will serve up to 250 cows a year if the services are evenly distributed; but as it is impossible to regulate the periods of heat, it is desirable to have a bull for each forty cows or so.

SOME FRENCH SWEET WINES.

By F. de Castella, Government Viticulturist.

(Continued from p. 407, Vol. XVIII.)

The Sweet Wines of Tarn Gaillac, &c.

Though not one of the great wine-producing departments of France, since it occupies only twentieth rank, Tarn produced at 1919 vintage, twelve and a half million gallons, or considerably more than our Commonwealth, and much more than either of the better known Cote d'Or and Marne departments, celebrated for the Burgundy and Champagne districts which they respectively include.

As elsewhere in France, the great bulk of the Tarn wines are dry reds, varying from vin ordinaire to rather fuller-bodied and higher-coloured wines, esteemed for blending, and including some very fair table wines. These are made from such varieties as Duras, Negret, Prunelar Muscat (a variety of Malbeck), Brancal (akin to Cabernet), Milgranet, Bordelais or grosse Merille, and Castets. Most of these are sorts peculiar to South-west France, but Syra (our Shiraz) and Gamay have been somewhat recently introduced.

It is, however, the sweet and fruity white wines* which more particularly interest us here; for the production of such wines certain localities in Tarn have long been well known, amongst others Gaillac, a small town 13 miles west of Albi, the capital of the department, and about 30 miles north-west of the better known town of Toulouse. It is thus situated in extreme South-central France, and only some 80 miles from the Spanish frontier.

Gaillac has long been celebrated for its white wines. Baville, *Intendant,* or Governor of Languedoc province, in a report dated 1698, tells how the wines of this locality, sent down the Garonne to Bordeaux, were much appreciated by the English. These wines were long the object of an important export trade with England and Holland. Drastic action by the local authorities, such as would scarcely be tolerated to-day, jealously guarded a high quality standard. Only the recognised varieties of the district could be planted; manuring with farm-yard manure was prohibited; the application of composts, and curiously enough of fowl manure, was, however, occasionally permitted. Vintage was not allowed to commence before a date fixed by the authorities, lest insufficient maturity should deteriorate the type. For exportation a special seal had to be affixed to each cask certifying that it was really grown in the district and up to the required quality standard.

The best vineyards are situated on the hilly ground on the right bank of the river Tarn after it leaves the plain of Albi. These hills are of tertiary age (Miocene), whilst in the valleys, deep, gravelly, and sandy alluvial soil abounds. The average rainfall is 29½ inches, fairly well distributed throughout the year; the climate is intermediate between that of Montpellier and Bordeaux. In these well-exposed vineyards high gravity musts are obtainable. At the end of September and early in

* For much of the following information I am indebted to an article on *Le Vignoble et les vins blancs de Gaillac,* by J. Vincens, in *La Revue de Viticulture,* November, 1911.

October this reaches at least 12°B., rising often to 13° and 14°, and even to 16° and 18° if Botrytis cineria* has invaded the grapes.

It is in its vine varieties that Gaillac mainly differs from other French sweet wine districts. In Dordogne, as at Sauternes, the well-known trio of the latter district are grown, viz., Semillon, Sauvignon, and Muscadelle. At Gaillac three entirely distinct sorts predominate, viz., Mauzac, Lenc de L'el, and Ondenc. Since these are mainly responsible for the peculiar flavour, character, and bouquet of the wines of the region, they merit brief description.†

Mauzac, or to be more accurate, the Mauzacs, as there are several sub-varieties, white, green, rose and black. These are merely colour variations of the same vine, the tendency of which to sporting or bud variation necessitates careful selection of scions in order to eliminate faulty types which set their fruit badly. Mauzac rose is the best bearer and the earliest to ripen, but it is less vigorous, especially when grafted, than the white or green varieties; the last named ripens late (third period). Although setting of the flowers is sometimes irregular, Mauzac is estimated on an average to yield 300 to 360 gallons per acre. The skin being fairly resistant, the grapes are sometimes cut for table use in winter. When fermented alone, its wine is not without quality; after a while it develops a curious taste of cider, becoming *Maderisé,* or oxidized. The wine is rich in acids, extract and tannin. If sulphured (Sauternes style) to retain sweetness, a remarkable wine is made from this grape when grown on hillsides. The alcohol strength is variable; though barely 16 per cent. proof, in some Haute-Garonne vineyards, it sometimes exceeds 23 and 24½ per cent. at Gaillac. Being fairly acid—usually over 11 per thousand as tartaric—its must is used to increase the acidity of such other sorts as Lenc de l'el and Oundenc.

Lenc de l'el.—This name is local patois for *loin de l'oeil* (far from the eye, in French). This seemingly sentimental name finds a matter of fact explanation, since it refers to the long stalk which places the bunch at a considerable distance from the eye or bud, on the opposite side of the cane. The variety is of great antiquity in the district; it is vigorous, and thrives on the different Ruparia and Rupestris stocks. Though usually short pruned, it is sometimes given a rod. It starts growth early (ten to fifteen days before Mauzac), and ripens fairly early (second period). It is a medium bearer, or barely medium, but its other qualities are of first-class order. Its wine is of highest quality and very alcoholic when grown on dry and well-exposed hillsides, where it resists damage from rot (moulds) far better than on flat land on which its yield increases to a remarkable extent. At very complete maturity its must contains 34.3 per cent. of sugar (about 17½° B.), equivalent to a wine of 29.7 per cent. proof, but its acidity is very low—3.4 per cent. as tartaric. If vintaged alone, fermentation would be difficult, so it is usually blended with the more acid Mauzac. At Gaillac its fermentation is nearly always incomplete; hence the sweet taste—often too sweet—of these sparkling wines. Wine made from

* *Botrytis cineria* is the fungus causing the white mould, known in Sauternes as *pourritre noble* (noble rot), which invades the grapes at vintage time in a showery autumn: the resulting damage to the skin of the berry facilitates evaporation of water, hence concentraton of the juice. Other changes also take place, notably the production of oxydase, a soluble ferment which causes the wine to readily take on a Madeira character, or become *Madérisé.* Unless prevented by heavy sulphuring, the resulting wine is of a deep yellow or brown colour.

† The following descriptions are abridged from the articles by Tallavignes, in *Ampelographie.*

Lenc de l'el often contains 24.5 to 26 per cent. proof, with untransformed sugar still remaining.

Ondenc or *Oundenc* is closely associated with Mauzac and Lenc de l'el in the vineyards of Gaillac, though it is losing popularity on account of its early ripening, and of some other defects, such as its poor yield, its small and scattered berries, and its susceptibility to spring frosts and to oidium. It is rather a poor grower, with foliage of a yellowish tint. It is only on hillsides that its qualities become marked; it yields little even on flat land. Its declining popularity is to be regretted, as it played a useful part, giving a special *cachet* or character to the Gaillac wines owing to its refinement, distinction, and a peculiar bouquet of its own.

We have here a most interesting example of how the judicious blending of three quite distinct sorts can have the happiest influence on the character of the resulting wine. The high acid of Mauzac corrects the deficiency of the other two, which, nevertheless, contribute bouquet and refinement. In the older vineyards the proportion of each was as follows:—60 per cent. Mauzac, 30 per cent. Lenc de l'el, and 10 per cent. Oundenc; a proportion which has not been sufficiently respected since reconstitution, the tendency being to exaggerate the area of the better bearing Mauzac, at the expense of the refinement and peculiar character of the wine.*

To-day Gaillac produces fruity and more or less sweet white wines of several distinct types, which may be grouped as follows:—

Fruity table wines,
Macadam,
Sparkling wines.

Dry white wines, often of excellent quality, are also made, sometimes unwillingly, owing to fermentation refusing to stop at the desired point, with the result that the wine becomes dry. Such wines are, however, less profitable to the maker than the other types, and, as Vincent advises, in well-situated Gaillac vineyards dry white wines should only be made when, for one reason or another, the grapes must be vintaged before complete maturity, when the must contains barely 17 per cent. of sugar (10 Beaumé), the acidity being still over 8 or 10 per cent. Such wines are easily obtained, after light sulphiting, by ordinary wine-making methods. He recommends as a precaution, which is too often neglected, the addition of tannin (extracted by alcohol) at the rate of 20 to 30 grammes per hectolitre (3 to 4½ ozs. per 100 gallons).

Fruity Table Wines.—It is no doubt to this type that the ancient reputation of Gaillac is due. These wines are in some ways similar to those of Sauternes and Graves, and also to Montravel of Dordogne, but differ considerably in bouquet and flavour, owing their peculiar character to the special grapes from which they are made.

Other choice varieties may give as much alcohol, and as much sugar, but they have neither the aroma nor the bouquet of genuine Gaillac. Whatever may be the

* Similar cases are not uncommon in the world's finest wines. Thus we have the Sauternes trio, Semillon, Sauvignon, and Muscadelle. The choicest Ports are made from three main varieties, viz. Touriga, Bastardo, and Alvarelhas, with which are often blended, in the vat, a varying and sometimes considerable proportion of other sorts. The Bordeaux Clarets are chiefly made from four sorts—Cabernet, the dominant variety, of which there are several sub-types, blended with Merlot, Malbeck, and sometimes Verdot.

This rule is not, however, an invariable one, and some of the world's finest wines are made from one grape only. Thus we have Champagne made from Pinot, Burgundy from Pinot (a different sub-variety), Chablis from Chardonnay, Sherry from Palomino, &c.

destination of the natural sweet wine, the must must contain at least 22 per cent. sugar (12.5 Beaumé). The sweeter the must the greater the chances of success. To insure perfume, over ripeness must be awaited, and even the invasion of the grapes by botrytis The grapes are vintaged when very ripe and low in acid. Gathering should be postponed until the dew has been evaporated by the sun. They are stemmed and pressed. After addition of tannin, light sulphiting and aeration, the must is *débourté* Mistake has been made in abandoning the practice known as *guillage*†, and in replacing it by frequent filtrations with exposure to air in sleeve filters. According to the origin and composition of the must and to temperature, fermentation proceeds more or less rapidly—if too active it is moderated by successive additions of bisulphite, with or without filtration. The grower generally sells his sweet wines during the first year. If kept in cask another year, clarified by racking and fining, and bottled when at least fifteen or eighteen months old, they then develop into wines of a fine golden yellow colour, alcoholic, yet discreetly so (*ayant un moutant discret bien qu alcoolique*) with accentuated and agreeable aroma and bouquet, and capable of acquiring (*sève*)‡ with bottle age.

The results of a series of analyses carried out on musts and wines of this class are resumed at follows:—

MUSTS.

	Average.	Maximum.	Minimum.
Gravity	1.107	1.128	1.096
Degres Beaumé	13.8	15.5	12.5
Sugar (per cent.)	25.6	31.1	22.6
Corresponding to Alcohol by Vol.	15.06°	18.3°	13.3
Tartaric Acid (‰)	4.48	5.5	2.5

WINES (ANALYZED WHEN A YEAR OLD).

	Average.	Maximum.	Min'mum.
Alcohol (per cent.) by Vol.	9.95	11.85	8.8
Proof Spirit (per cent.)	17.3	20.7	15.4
Reduced Extract (‰)	24.37	38.	14.33
Total Acid as Sulphuric (‰)	4.46	4.11	4.9
Volatile Acid as Sulphuric (‰)	0.51	1.08	0.20
Reducing Sugar (per cent.)	7.31	10.2	3.49
Polariscope Deviation	—8.15°	—12.58°	—4.0°

The low alcohol strength and relatively high content of unfermented sugar is very noticeable. M. Vincens comments on the high extract of these wines, due in part to dextrane and other products resulting from the action of the botrytis fungus. He also points out that these special wines do not conform to the rules usually observed in interpreting the analysis of ordinary French wines (Roos' ratio, alcohol-extract ratio, &c.).

Macadam Wines.—These partially fermented and still fermenting wines are much the same as those of similar type made in Dordogne, at Montbazillac (see *Journal* of July, 1920), though they differ in flavour and character, owing to their being made from distinct varieties of grapes.

"In certain regions," says M. Vincens, "white wine still sweet and in full fermentation is appreciated and commands a good price under the name of *Macadam* or *Bernache*. Macadam is, of course, a product only consumed at certain seasons of the year. Earliest deliveries fetch the highest prices. The production of this type is always profitable. Under the intelligent impulsion of the

* Debourbage, literally, removal of mud, has been described previously.
† Guillage will be further described in connexion with the Jura wines.
‡ Sève is a French term which has no English equivalent. It is distinguished from bouquet in being discernible rather by the palate than to the nose.

Saint-Michel Co-operative Cellar, at Gaillac, the production of Macadam has been developed in the region. But though profitable and apparently simple the making of this wine is risky. The most forward grapes are gathered early, stemmed, pressed, and filled into sulphured casks. Thanks to their still high acidity, fermentation soon commneces. Forwarded by special rapid freight (*grande vitesse*) in casks provided with a vent, these wines can reach their destination in suitable condition, but lack of sugar, excess of acidity, high temperatures, and shaking in transit often provoke too active a fermentation, and hence leakages, drying out of the wine, &c."

Improved methods are suggested, such as later vintaging, avoiding damage to the fruit before crushing, early sulphiting and more judicious use of SO_2.

"The relative sterilization of the musts by aeration and multiplication of yeast cells seems capable of giving more certain and more constant results, and of usefully prolonging the period during which 'Macadam' could be consumed."

Sparkling Wines.

The produce of the white varieties is very suitable for conversion into sparkling wines which may be classed in three categories: natural sparkling wines, wines prepared according to the champagne method, and carbonated wines. The most highly appreciated and best known sparkling wine of the locality is the natural sweet white wine, which has long been known under the name of Blanquette de Gaillac. When successful it is a wine light in colour, with a pretty tint, sometimes of a greenish yellow, slightly cloudy from the yeast cells still in suspension causing a rather fugitive effervescence. Its aroma is very suave, its flavour agreeable, and it may well be said of it that it has a taste of fruit, and of delicious fruit. But it is not always successful; sometimes it happens to be too cloudy, to sparkle too little or too much.

Improvements are suggested—the use of sweeter musts, with at least 23 per cent. sugar (12½ *Beaumé*), the addition of tannin, moderate sulphiting, and slow fermentation until checked by the alcohol produced—fairly frequent rackings, a fining during winter, and bottling in March. Fermentation in bottle should be supervised.

By fixing an *aphromètre* (small pressure gauge) to a couple of bottles of each lot, the internal pressure could be watched; if too high the bottles could be up-ended until sufficiently reduced, when they could be laid down again. If the fermentation in wood has been well carried out excessive pressure rarely occurs, fermentation ceasing some time before the complete disappearance of sugar.

The Diè method of wine making is very suitable for the preparation of Blanquette de Gaillac.

The Champagne method applied to the good white wines of Gaillac gives fairly good results, though the cost price of the method seems to be too high for it to be profitable.

Carbonatation, which is more economical, may easily satisfy those who only seek, in a sparling wine, noise and limpidity—the satisfying of the ear and the eye. True *Gourmets* will derive infinitely more pleasure and charm in emptying a bottle of naturally-sparkling Gaillac.'

The Sweet Wines of Basses Pyrenees.

These need only brief reference. The most notable among them are the wines of Pau and Jurencon. They are slightly sweet, fruity, alcoholic, and rapidly become *Maderizé* or tawny with age; the special bouquet which they then develop varies according to the vintage, and sometimes recalls the odour of truffles or of quinces, owing to the presence of œnanthic ether. The white grapes, grown in the district are Camarao blanc, Folle-Blanche, Claverie, Courbu, and Petit Man-

sein, which seems to be the most important element*. The wine of Jurencon is chiefly celebrated on account of its having been used to moisten the lips of Henry IV., the great King of France, immediately after his birth.

. . . . . .

Though Macadam is a type unknown here, and one for which the creation of a demand is problematical, the method by which it is made is interesting; it also illustrates the extent to which yeast starvation can be utilized to retain sweetness in a wine of low alcohol strength. It is obvious that the same method can be even more easily applied to wines of fuller type, and the following essential practical hints by M. E. Floutier will be read with interest.†

The juice of Clairette grapes, pressed immediately after gathering, is fined with isinglass and filtered with bag-sleeve filters. About twenty-five bags are required for a *demi-muid* (about 100 gallons) at the first operation. The white wine thus clarified, is allowed to remain in casks without bungs for ten to fifteen days when the second filtration, much the more important of the two, is carried out.

For this filtration six bags are employed (the number of elements in the filter is of little consequence). The wine to be filtered is placed close at hand, it is stirred to make it cloudy and even throughout. The filter is filled by means of a bucket. A plug is withdrawn from one of the sets, and the filter is kept as full as possible (two operators are necessary). When the first bag runs more slowly a second plug is withdrawn, and so on as long as the level of the liquid in the filter tub can be maintained. It is rare that the whole six bags are needed; it is often possible with two or three filter bags to treat 100 gallons of white wine, and to obtain clarification equal to that given by filter paper.

At the second filtration the same bags are used as at the first, but the sleeves should be much narrower; obviously a large bag and a narrow sleeve make for thorough clarification. The number of bags to be used depends on the proportion of sugar contained in the wine, but usually one-tenth as many are needed as at the first operation. For the second filtration it is important to have cloudy wine for each filter element. To insure this care should be taken to put to one side the wine which must be passed through again, and to continue with the most cloudy wine until the bags commence to run slowly.

* See *Sebastien—Les Vins de Luxe.*

† "How to Make Sweet White Wine," by M. E. Floutier, in *La Revue de Viticulture*, 18th November, 1897.

CANADA'S OUTLAY ON AGRICULTURE.

Agricultural experiment work and education are fully appreciated in Canada. The Dominion Parliament made appropriations totalling 4,366,000 dollars for the year 1920-21, as against 3,648,000 dollars for the previous year.

This does not take account, of course, of the amounts voted by the various provincial legislatures. In Ontario, the vote for 1920 was 1,594,500 dollars, as against 1,339,932 dollars in the previous year; the amount did not include 336,000 dollars granted by the Dominion Government. In Manitoba, the provincial vote for 1920-21 was 582,490 dollars, as against 476,605 dollars for 1919-20. In Alberta, apart from certain votes chargeable to capital, there was allocated for 1920-21, 602,745 dollars, as against 552,354 dollars for the previous year.

A GIPPSLAND PIONEER'S WORK.

J. S. McFadzean, Senior Dairy Supervisor.

Gippsland country is most interesting to travel over, being full of variety, both naturally and as the result of each selector's individual energy or apathy, as the case may be. The more natural variations of contour and soil, timber and scrub, foliage and wild flowers, fern glades and land slides, all make travelling over such country as lies around Leongatha and Mirboo particularly interesting; but added to these is the wide range of success which has been attained by different families in their efforts to convert their share of this bush land into a profitable agricultural proposition.

Some people are born to be successful farmers as certainly as others are to succeed in trades, professions, or other callings. While some farms are never kept with even a suggestion of comfort or home-like appearance, others will be run with that tidy systematic arrangement which demonstrates that the owner loses no unnecessary time and wastes no energy, but gets a maximum return for each day and hour of his labour. The well-cared-for steading and orderly surroundings tell of thrift, energy, and a daily round of duties carried through as a pleasurable occupation, and of the full interest taken by the family in everything connected with the home.

The artisan, well knowing that systematic working is a wonderful time saver, and being desirous of making the most of his ability, will lighten his labour by avoiding all unnecessary handling of tools and material: equally so will the thoughtful farmer conserve his energy by using his brain throughout his daily work. The blunt saw, the badly-hung gate, the slack wires in the fencing, the broken culvert across the road, are each examples of small items which may cause waste of time at some emergency, much greater than would be required to have put them in proper order when the defect was first noticed: yet many farmers drift through their whole life-time with their outfit and property in a state of complete disrepair. So much, indeed, is there of careless working on farms that where instances are seen of the duties being carried on under an orderly system they call for special notice.

This preponderance of untidiness is the more difficult to explain because almost every one recognises that work is always more easily carried through under tidy conditions. "A place for everything, and everything in its place" will always stand as one of the best mottoes for the farmer, because an observance of it makes for efficiency; while careless method will always leave necessary work undone, causing loss of time at periods when it is most essential that everything should be in effective running order. The tidy farm is a demonstration of good management, and invariably such will be found a profitable concern.

About forty-three years ago Mr. Dan. Aberdeen, then a young man of eighteen years, came with his brother William from Guildford, and selected land on the Berry's Creek, between Leongatha and Mirboo North. Moe was at that time the nearest railway station, and from there the journey to where they decided to settle was along a pack-horse track. Few who know this country as it is now can realize what such tracks were in those days. These brothers Aberdeen were actually the first to open up this Berry's Creek locality, Mr. Dan. Aberdeen's block being

of 390 acres, some 12 miles from Leongatha and 5 miles from Mirboo North.

The whole of this country was then in a very rough condition, heavy timber running up to a height of 150 feet, with thick undergrowth covering all those hills on which only a few dry trunks and occasional tree-

Gippsland in the Rough.

ferns are now standing. The men who undertook the clearing of this land were big of heart and wiry of limb, or they could never have succeeded. Every year spent in this work was a struggle against Nature at long odds. The making of even the small clearing on which to build the first hut was a feat in itself, with timber and bush standing so thickly that there appeared no place in which to work. But the desire of a

home, which first starts the pioneer in search of a suitable block, keeps him toiling away year after year, fighting bush fires, carrying water in the summer, and frequently wading in mud for months of the winter, while cutting and burning off the timber in the tedious task of fitting each acre of rough country for grazing or cultivation, until the farm at last reaches the stage wherein it is a payable concern.

Every year of this struggle would furnish material to fill a volume in describing the hardships of each settler family, broken only very rarely by a day of such pleasurable relaxation as comes to the bush workers when some picnic or sports meeting is held—such days as the women folk of the home prepare for during several weeks. When the day is over the family return absolutely tired out, and the outing remains a happy recollection for months and even years afterwards.

No better evidence is required that they who literally cut their way into this bush were of the right stamp than that such prosperous centres as are now seen throughout Gippsland have arisen as the result of their labours. The soil which grew the big eucalypts and blackwood timber

Leongatha Country Now.

is now producing heavy crops of hay, potatoes, onions, fruit, &c., not to mention that largest crop of all—grass—which brings hundreds per cent. more money in beef, mutton, pork, butter, and rabbits to every Gippsland town than any of the more-regularly cultivated crops.

The saleyards, butter factory, and railway station at both Mirboo North and Leongatha each bear witness that even in these progressive districts grass is still the largest crop; and quite a number of the farms here also show that even in the early days of settlement the importance of good grass land was given much attention by the pioneers.

Mr. Aberdeen was amongst those who applied themselves to laying down permanent grass, and besides making regular sowings of rye grass, cocksfoot, and clovers, he introduced that great grass *paspalum dilitatum* from Hawkesbury College, New South Wales, in the year 1890.

As an all-round permanent pasture grass this variety of the paspalums has no superior in Australia. Though at its best under a warm climate

and good rainfall, it will still do better than any other grass on poor soil and light rainfall, withstanding alike both drought and frost conditions, and making a thick, green sward where most others would fail. Its only drawback is the labour required to remove it should the land subsequently be required for cultivation, summer ploughing and harrowing being the only way of getting rid of this grass, which no ordinary dry weather or attacks of rabbits can destroy.

There are many farms in this district which have paddocks thickly grassed with paspalum, and those on Mr. Aberdeen's "Deeside" farm are well worth inspection as demonstrating the closeness of the sward and the liking the stock show for this grass. Altogether 72 acres of the farm are under paspalum; and on account of the splendid sole of grass it gives in all seasons, these paddocks are kept specially for the dairy herd. It might also be mentioned that on this part of the farm the undergrowth was particularly troublesome to keep down, but as the paspalum became established the scrub disappeared; probably the close and constant grazing over it by the cows which ate down the scrub shoots as they appeared amongst the grass greatly assisted in this.

The farm is subdivided into nine paddocks, two of which are laid down in paspalum, five in English rye grass and clovers, while the other two, containing 20 acres, are cropped with oats, maize, peas, potatoes, &c., for stock fodder. Fifty-five head of dairy cows and eighty head of young cattle are carried, as well as horses and sheep. These latter are a select lot of Border Leicesters from the studs of Messrs. Cochrane, Sutherland and Anderson, whose stock are amongst the best of many of the best of Victorian Border flocks. There is also kept here a good breeding pen of Tamworth pigs, consisting of a boar and three sows, the progeny from which find ready sale at satisfactory prices.

Over some ten years past the Aberdeen family have specialized on Ayrshire dairy cattle on this "Deeside" farm, the first stud-book bull used being obtained in 1910 from Mr. B. R. Hobson, of Yarram, and was a son of Jamie of Oakbank, from Florida by Bonny Lad. To mate with the heifers of this Oakbank bull in 1913 President of Victoria Bank (Jock of Burnside *ex* Fairymaid) was purchased from Mr. McNabb. Then in 1917 this bull was replaced by Gallant of Oakbank (by Prelate *ex* Bonnie), a bull which has good show-ring type as well as being of good dairy breeding, he having won championship prizes at the Melbourne Royal Show in 1913 and at Traralgon and Bendigo National Shows. The result of using bulls of this class has been to build up a splendid Ayrshire herd, handsome in appearance and excellent in utility, for besides being good milkers the cows of this herd have an average test of 4.8 per cent. of butter fat.

For eight years past the management of "Deeside" has been in the hands of Mrs. Aberdeen and family. Of these, the three brothers Charles, Tom, and John enlisted; but, breaking down in camp through rheumatism, John was forced to return home and do his part by keeping the farm going in his brothers' absence. After three years of active service the other two brothers were both fortunate enough to see the war ended, although Charles' experience opened rather dubiously in his being on the *Ballarat* when it was torpedoed. He, however, returned after three years' active service, early in September, 1919, and has once more settled down to steady farm work.

Being naturally inclined to mechanical work, Mr. Charles Aberdeen is gradually improving the farm outfit in every way which may assist in labour saving, and as a consequence the shedding here is somewhat above the average. The milking shed is roomy and well fitted, with the floor well laid in concrete.

This laying down of concrete floors and drains is a part of farm work to which much more attention could well be given by farmers themselves, more particularly as satisfactory labour appears to be growing daily more scarce and high-priced. The mixing and laying down of concrete is very simple work for any handy man, but farmers are often adverse to trying anything new; yet concrete is more easily laid than bricks, and for both floors and drains is more lasting, and is better for stock to walk on. By the farmer doing the work himself, and laying the flooring of one or two bails as opportunity occurs, the whole of the flooring can be gradually laid with little or no hindrance of the regular shed work; whereas with hired labour the whole of the flooring may have to stand out of use for some two or three weeks before it firms sufficiently to carry the stock without damage.

The twenty-six bails on this farm are arranged on a very ingenious system, which allows of either each pair of bails, or of each alternate bail, being opened as required. This release is one of Mr. Chas. Aberdeen's own design, and is worked with a lever and double catch somewhat similar to that on a lifting-jack. From the separator-room, which is adjacent to the milking shed, a long stretch of overhead piping carries the milk to the styes, which are some 3 chains distant. These are also well floored, and well arranged with fodder loft above. Springs provide the farm with a never-failing supply of good stock water.

"Deeside" farm lies 12 miles from Leongatha, but only 5 miles from Mirboo North. On the adjoining block on the Mirboo side, which block was that originally selected by Mr. Will. Aberdeen, there is a splendid deposit of the best black coal. In fact, it was from a shaft here, close to Berry's Creek, that the sample of coal sent to the Paris Exhibition was taken. This sample was a block of 1 ton weight and of exceptional quality, and was cut from a 9-foot seam at a depth of 20 feet from the surface. With this coal deposit and the large outcrops of iron ore which occur in the district, Mirboo people for a long time hoped for an awakening of local industrial enterprise. The nearer and more immediate regular returns from farm produce and dairying have, however, proved so much more easy of attainment that both the coal and iron wealth of the district are now seldom mentioned by the residents.

During the past two years special attention has been given at "Deeside" to the top dressing of the pasture land, this being brought about through the cattle developing a persistent bone-chewing habit, but which the top dressing of the grass-land has completely cured. Wherever bone-chewing is persisted in by cattle, they are certainly not getting sufficient phosphates in their food to maintain their health, and the sooner this is remedied by the use of bone-meal, and at the same time by top-dressing the pasture, the fewer losses will occur from impaction and kindred digestive complaints. Top-dressing gives more grass and better grass, and is altogether very profitable work. This fact the Aberdeen family were not slow to recognise; and with regular attention the pasture land is now kept in good heart, and the dairy stock in good health; and from the entrance gate to the homestead the stock, plant,

pasture, fencing, &c., are each and all evidence of good farm management.

Some little while ago, when a Government Commission of Agriculturists from Western Australia visited this State, amongst other things inquired about was the cost of clearing this Gippsland virgin country and bringing it under cultivation. There is much country in the West similar to what this was in its rough state, but the Commission saw here that this land could not be cleared profitably by a direct cash expenditure. Clearing a 300-acre block really represents the life's work of one generation, and the pioneers of this district more often than not have been close to their "allotted span" by the time their farms reached a remunerative stage. Yet these pioneers have at least the satisfaction that they can leave behind them in the farm a profitable legacy to their family, and one which possibly is of a much higher value than they ever looked for.

SPOTTED WILT OF TOMATOES.

With a view to determining the cause of this disease, the Biological Branch of the New South Wales Department of Agriculture has made a careful microscopic examination of diseased plants. So far the examination has revealed no organism likely to prove causal. There are no traces of fungi.

Bacteria are, of course, almost omnipresent, but there are no indications in this disease of the presence of large numbers of bacteria, such as usually occurs in bacterial diseases of plants. Last year various bacteria were isolated, and healthy tomato plants infected, but all the results were negative, failing to produce the disease. At present, though the field indications are that the disease is infectious, the Department is unable to indicate the means of transmission, and all attempts to transmit the disease from diseased to healthy plants have so far failed.

Diseased leaves brought into contact with healthy plants have not brought about infection. The expressed juice of diseased plants when introduced into healthy plants did not give positive results.

The possibility of insect transmission has been considered. Two insects suspected (*Nezara viridula,* and the common green aphis) have been taken from diseased plants and put on healthy ones, but no transmission of the disease has been thus effected. The only lesion revealed in microscopic examination of the leaves is collapse of the epidermal or superficial layer or cells in patches. A careful examination of field data seems to discount the possibility of the disease being normally seed-transmitted.

Of various specifics recommended, none have apparently yielded satisfactory results.

So far as further research goes, the Biologist is practically at a standstill for the want of suitable control houses, and a small experiment area in which to continue the work.—*Agricultural Gazette of New South Wales,* January, 1921.

POTATO PRODUCTION.

IT PAYS TO SPRAY.

By S. G. Harris, Senior Potato Inspector.

With the increasing cost of land (more especially in our best potato areas), the increased cost of production, harvesting, and marketing of the crop, it is ever becoming more necessary that the soil should be made to produce to the utmost of its capacity. The old haphazard methods of planting a crop and sitting idly by, trusting to Providence for a harvest, must go, and the lessons learned by years of patient toil and scientific research must be applied if the man on the land is ever to attain to a position of affluence and ease and reap the full reward of his arduous labour. Perhaps in no instance, unless it be in the orchard, does this apply with greater force than to the potato-grower.

His land is the highest-priced of any in the State, his cost per acre for seed, cultivation, harvesting, and marketing is greater than for any other crop (except onions) grown on the farm, hence it is imperative that his return should be all that it is possible to get from each acre, and the object of this article is to assist the grower to attain this very desirable goal. The majority of the growers to-day, I think, realize that, with the increased number of diseases and insect pests which are attacking the crops, there is an urgent necessity to adopt new methods of crop treatment, and one of the most effective of these is to spray the crop, irrespective of whether the climatic conditions are "blighty" or otherwise.

There is a tendency on the part of growers to think only of spraying the potato crop for the cure of Irish Blight (*Phytophthora infestans* (de Bary). Let it be clearly understood right here that it is impossible to cure a crop that is attacked by the disease. If the attack be only slight, the spraying would be beneficial, as it would, to a large extent, prevent its spread to the healthy plants, and thus a partial crop would be assured, whereas without the benefit of the spray the whole crop may be destroyed. It would be just as beneficial to spray a man suffering from internal cancer as to spray a potato haulm attacked by Irish Blight, with a view to its cure, for in neither case would it be possible to reach the seat of the disease.

If positive results are to be obtained the crop should be sprayed before the disease makes its appearance, and if this be done, the grower need not fear an outbreak of the disease. Further, it pays to spray apart altogether from any consideration of Irish Blight, as there are many minor fungus diseases and insect pests which attack the growing crop, and although none of these is sufficiently serious or destructive to attract attention, they are nevertheless constantly sapping the vitality of the plant and retarding its growth, and shortening its period of existence. These minor diseases and insect pests are destroyed, or kept in check, by the application of the spraying solution.

A sprayed crop will grow much more luxuriantly, and will continue its growth from two to four weeks longer than an unsprayed. The following results were obtained from two of the many successful demonstrations of spraying which have been given by the Department in different parts of the State. In 1917 there was a very severe outbreak of

Irish Blight in the early crops in the Warrnambool-Koroit district, and the opportunity was seized to give a demonstration in the late crop, as it was then too late to do any good with the early one. Mr. A. Skilbeck, of Southern Cross, near Koroit, placed a field of 20 acres at the disposal of the Department, and 5 acres, nearly in the centre of the field, was selected. When the first spraying was given the plants were about 6 inches high. About three weeks later a second spraying was applied to half of the 5 acres; thus 2½ acres were sprayed once, and 2½ acres twice, the remainder of the field remaining unsprayed. Mr. Skilbeck dug the crop, and supplied the figures recorded below. At the request

Spraying Experiments at Southern Cross.

(1) Portion of Unsprayed Plot.

of the Department, the diseased and small portions of the crop were kept separate, so that the actual loss of tubers attacked by the disease at the time of digging could be determined.

UNSPRAYED.

Good	2 tons 8 cwt. per acre.
Waste through disease ..	1 ton 4 cwt. per acre.
Small	0 ton 12 cwt. per acre.

ONCE SPRAYED.

Good	4 tons 12 cwt. per acre.
Waste through disease ..	0 ton 12 cwt. per acre.
Small	0 ton 12 cwt. per acre.

Spraying Experiments at Southern Cross.

(2) Portion of Once-Sprayed Plot.

(3) Portion of Twice-Sprayed Plot.

TWICE SPRAYED.

Good	6 tons	0 cwt. per acre.
Waste through disease ..		Nil.
Small	0 ton	6 cwt. per acre.

At the time the cost of spraying was high, as the price of bluestone and soda had soared phenomenally, yet it paid handsomely to spray, as the following figures will show. When this crop was being marketed the average price at the local station was about £3 per ton, which would give the following results:—

UNSPRAYED.

2 tons 8 cwt., at £3 per ton .. .. £7 4s. 0d. per acre.

ONCE SPRAYED.

4 tons 12 cwt., at £3 per acre	£13	16s.	0d.
Less cost of spray material	0	17s.	0d.
Net return	£12	19s.	0d. per acre.

TWICE SPRAYED.

6 tons, at £3 per acre ..	£18	0s.	0d.
Less cost of two sprayings..	1	14s.	0d.
Net return	£16	6s.	0d. per acre.

The second plot selected by way of illustration was an area of about 3 acres sprayed in 1919 on the farm of Mr. Truett, Bunyip. Six rows were left unsprayed on each side of the plot as checks, and the remainder equally divided, and sprayed once and twice respectively, with the following results, which were supplied by Mr. Truett, after digging:—

No. 1, unsprayed, dug green—

Good—2 tons 8 cwt. per acre.
Small—14 cwt. 1 qr. 16 lbs. per acre.

No. 2, once sprayed, dug in full growth—

Good—3 tons 4 cwt. per acre.
Small—13 cwt. 1 qr. 21 lbs. per acre.

No. 3, twice sprayed, dug in full growth—

Good—4 tons 16 cwt. per acre.
Small—5 cwt. 3 qrs. 0 lbs. per acre.

No. 4, unsprayed, ripened off—

Good—2 tons 14 cwt. per acre.
Small—15 cwt. 0 qr. 14 lbs. per acre.

There was no Irish Blight in the crop, but in the unsprayed check rows there was a good deal of "Early Blight" (*Alternaria solani*), and when the sprayed portion was quite green the unsprayed check rows were dying off. Had the whole crop been allowed to ripen the results would have been still greater in favour of the sprayed plots.

When this crop was being marketed the price was £14 per ton, and the following is the net value of each plot:—

No. 1, Unsprayed (Dug Green).

2 tons 8 cwt., at £14 .. .. £33 12s. 0d. per acre.

No. 2, Once Sprayed (Dug in Full Growth).

3 tons 4 cwt., at £14 ..	£44 16s. 0d.	
Less cost of spray material	0 17s. 0d.	
Net return		£43 19s. 0d. per acre.

No. 3, Twice Sprayed (Dug in Full Growth).

4 tons 16 cwt., at £14 ..	£67 4s. 0d.	
Less cost of spray material	1 14s. 0d.	
Net return		£65 10s. 0d. per acre.

No. 4, Unsprayed (Ripened Off).

2 tons 14 cwt., at £14 .. .. £37 16s. 0d. per acre.

Many other demonstration plots have been sprayed, but the limits of space for this article would be greatly exceeded if the results in every case were fully set out as above. Sufficient evidence has, however, been obtained to enable it to be stated positively that, even with the most conservative estimate, on an average, the crop yield can be increased from 50 per cent. to 100 per cent. by systematic spraying.

In computing the value per acre of the yields in the two cases cited the same value per ton has been allowed for the produce from each plot, but, as every grower knows only too well, there is a very material difference in the market value of potatoes taken from a 2½-ton "blighted" crop, and those taken from a 6-ton clean crop, so that in actual practice the difference in value from the sprayed and unsprayed would be much greater in favour of the former than is shown in the examples quoted above.

Time and Method of Spraying.

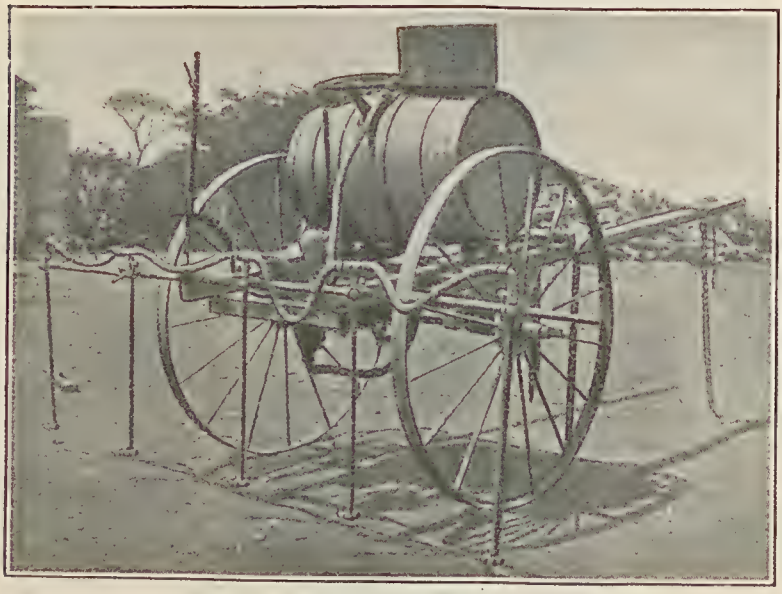
That the full benefit of spraying may be obtained, it is necessary that the crop should be protected from the earliest possible period of its growth, and the first application of the spray should be made when the plants are from 4 to 6 inches high. The time allowed to elapse before the second spraying will be determined by the growth of the crop and the prevailing weather conditions, but it should not be less than two nor more than three weeks.

The conditions most to be feared are misty or showery weather with a fairly warm atmosphere, or what is commonly known as "muggy." If this condition prevails, then it will be necessary to spray the crop the second time not more than a fortnight after the first spraying, and if the weather still continues bad, a third application may be necessary, and should be given just about the flowering period.

The third spraying, however, has never been found to be necessary in any of the demonstration plots, as (except in very abnormal seasons), even when a wet summer and autumn are experienced, the rains are usually of short duration, and followed by hot, dry spells, which will stop the progress of Irish Blight, though it may have made its

appearance on isolated haulms. Sometimes there may be seen through the crop quite a number of browned and blackened leaves, and often growers are in doubt as to whether it is the result of wind, frost, or blight.

The following is a very simple and effective means of determining whether this discoloration is due to blight. Collect some of the leaves, and place them between two sheets of damp blotting or coarse brown paper, and put them in a warm place, where the temperature will be, say, from 70 to 80 deg. Fahr., keeping the paper moist for about twelve to sixteen hours. If the discoloration has been caused by blight, a fine white mould will be found to have developed on the green part near to and around the blackened area.



A Horse-Power Sprayer.

For ordinary farm use a horse-power machine, similar in construction of the wood-cut here illustrated, will be necessary, but for small plots and garden areas a knapsack sprayer will be found to be quite effective, and with one of these a man can prepare the solution and spray from 1½ to 2 acres a day.

Materials and Method of Mixing the Solution.

The Burgundy or copper soda solution has been used in all the demonstration plots, and is recommended in preference to the Bordeaux mixture for the following reasons:—

1. It is more easily mixed.
2. Is not so liable to clog the nozzle of the machine.
3. Adheres longer to the leaf, and is not so easily washed off by rain.

The following are the proportions used:—

8 lbs. bluestone.
10 lbs. washing soda.
40 gallons water.

Two barrels are necessary, of about 8 and 40 gallons respectively, and the bluestone and soda must be dissolved separately, the bluestone in the smaller wooden barrel, and for the soda a kerosene tin or ordinary bucket may be used. When both the bluestone and soda are thoroughly dissolved sufficient water should be added to each to make 3 or 4 gallons of solution. Ten gallons of strained water is then put into the large barrel, and the bluestone and soda solutions are poured slowly into the barrel and stirred vigorously during the pouring process; water to make up to 40 gallons of solution is then added slowly, the contents of the barrel being stirred continuously until the mixing process is complete.

Spraying Potatoes.

The bluestone and soda may be dissolved and allowed to stand separately for three or four days, but when it is mixed it should be used as speedily as possible, otherwise it will deteriorate.

A quarter of a pound of Paris green dissolved in a gallon of water and added to the copper-soda mixture will prevent an attack by potato moth (grub).

The adhesive properties of the spray may be greatly increased by boiling 1 lb. of flour in 1 gallon of water, and when boiled make up to 8 gallons of solution by adding cold water. To each 40 gallons of the copper-soda add 3½ to 4 gallons of flour solution.

A preparation known as "Blighty" has recently been placed on the market, and is this year being tested in some of the demonstration plots. "Blighty" is, I believe, in reality Burgundy mixture in a ground form,

and mixed dry in the proper proportions, and is ready for use immediately by simply mixing in cold water. If it be as effective as the makers claim it to be, it should take the place of the copper-soda mixture, as it is so much more easily handled, and will prove to be a great saver of time and labour.

All that is required is to dissolve 13¼ lbs. of the mixture in 1 or 2 gallons of water, pour it into the barrel of the machine, and add water to make 40 gallons of solution, keeping it well stirred the whole time.

The present cost of "Blighty" is about 50 per cent. greater per acre than the copper-soda solution, but this is compensated for, to a large extent by the saving in the time and labour involved in preparing the mixture. This preparation was used with great success in the British Isles during the war period, and is highly recommended by prominent growers there.

Spraying for Potato Moth (*Phthorimœa operculella*).

The losses sustained by growers through the ravages of potato moth (grub), taking a period of, say, five years, is greater than that caused by Irish Blight, and in a dry season must amount to scores of thousands of pounds sterling. Fully 75 per cent. of this loss could be avoided by spraying the crop (if it has not already been sprayed with copper-soda-Paris green) with a solution of arsenate of lead, 1lb. to 25 gallons of water.

There are numerous broods of the moth during the spring and summer months, the last brood of the season remaining in the pupa, or chrysalis, stage of development during the winter months, and the moth from this brood commences to fly in the spring or early summer. Each female moth will lay from twenty to thirty eggs, and it is imperative that the produce of this first laying should be destroyed, if the crop is to be fully protected. In the growing crop the moth usually deposits her eggs in the foliage, and these hatch out in from six to ten days, and immediately commence to feed on the tender leaves, and afterwards find their way down to the tubers. There is also another very prolific source of tuber infection, *i.e.*, during the digging of the crop.

When the crop is badly infested the haulms, and even the surface of the soil is covered with the young grub, and as the crop is lifted and shaken on to the surface the tubers are immediately attacked, with the result that a consignment, which is bagged apparently clean and in first class condition, will probably, a week afterwards, when it arrives at its destination, be condemned, and have to be re-sorted before it is fit for sale.

The spraying should be done when the moth first makes its appearance in the crop, and the headlands and surrounding fields should be cleared of all solanaceous plants, such as deadly nightshade, kangaroo apple, native tobacco, &c., as these will provide a breeding ground for the moth, and neutralize, to a large extent, the effects of the spraying.

The Department of Agriculture has two horse-power spraying machines, and will be pleased to give demonstrations in any district, free of all expense to the growers, and the machines are available for use by any grower who is prepared to spray his own crop while the machine is in his district, and in the interim between the first and second spraying of the demonstration plots.

THE VALUE OF MILK RECORDS.

By R. T. McKenzie, Dairy Supervisor.

The weakest link in the whole system of dairying in Australia is the failure to keep milk records, in order that the value of cows as producers of milk and fat may be determined. Although the necessity for such information has been emphasized many times in this journal, one is again tempted to plead in these precarious days of high taxation, costly labour, and increased land values, to have business-like methods introduced into the industry. The agricultural outlook has undergone radical changes as a consequence of the war, and if dairy farming—or any farming for that matter—is to be successful, the old easy-going methods must give way to better ones.

At present the average dairy farmer is working in the dark. He knows, of course, the total income of the herd from his factory cheques, but has little knowledge of the actual return from each cow.

In Victoria the average annual production per cow is about 150 lbs. of butter fat, which is the lowest of all the butter-producing countries with the exception of Siberia (98 lbs.) and South Africa (110 lbs.).

With our congenial climatic conditions there is no reason why it should not be the highest in the world, for, in the words of the Scottish Agricultural Commission that toured the Commonwealth in 1910, "there must be few parts of the world where Nature does so much to help and so little to hinder the provident and industrious producer of milk."

It is impossible to estimate the real national loss to the State from the feeding and care of unprofitable cows. If the annual production of our average cow was increased by only 100 gallons there would be a national saving of £2,250,000 per year, assuming that there are 600,000 cows in the State and that milk is valued at 9d. per gallon. If the necessary steps were taken to increase the fat percentage by 1 per cent., on the present basis of cows and milk yield, they would result in an increase, approximately, of 12,500 tons of butter annually.

This improvement cannot be achieved without a great deal of energy, but it is worth the effort. Whether this improvement will be accomplished will depend primarily on Government Departments, for the producer will require the necessary education and financial assistance.

A great step in the desired direction would be the formation of co-operative herd-testing associations. The experience of every country that has adopted any well-organized system of herd-testing is that about 30 per cent. of the cows are profitless; indeed, many were charges on the rest of the herd. It will not be until such time as individual records of the herd are presented in black and white that the dairy farmer will comprehend the economic loss involved in milking unprofitable cows.

The writer made a close study of the herd-testing system during a recent visit to Denmark, where the idea originated. Probably no

co-operative undertaking has been of such tremendous economic advantage to the Danish peasant farmer as the "Control Societies." Attempts to judge cattle on their yield were made by some enterprising dairymen in Denmark over thirty years ago, but the elaborate methods involved to determine individual yields were a drawback. It was, of course, a simple matter to tabulate the weight of milk, but the amount of butter fat could only be estimated by the use of an apparatus used in conjunction with the steam-driven separator, in which many samples of milk could be tested in a few minutes. It was a cumbersome method, and, naturally, had to be done at the creameries, where there was little time to spare for that kind of work.

The discoveries about the same time of Gerber and Babcock of a simple, practical apparatus for estimating fat content of milk gave a great impulse to the movement.

This new apparatus was cheap, accurate, easy to work, and, above all, could be carried from farm to farm. This gave the opportunity for the development of the Co-operative Control Societies, which are generally reckoned to date from 1895. Since that date 700 societies have sprung into existence, and the average production of the dairy cow has increased from 120 to 240 lbs. of fat per year—100 per cent. increase! It has been estimated since the inception of the "Control Societies" that they have been instrumental in increasing the remunerativeness of the dairy cows in Denmark by £25,000,000.

Each Control Society receives direct Government aid to the extent of 200 kroner (about £11) per year. In order to obtain this the Society must have at least ten members owning in all not less than 200 cows. Each farmer pays 20 kroner (£1 2s.) entry fee and 5 kroner (5s. 6d.) for each cow tested per year. The local Control Societies are linked up or federated into a provincial association, which also receives a Government subsidy for carrying on the work. To-day there are 16,500 members owning about 250,000 cows—more than a quarter of the cows in the whole of Denmark. In addition, there are numerous farmers who do their own testing independently of the Co-operative Control Societies. A prominent Danish official put it this way: "If you don't test your cows you don't know your business and might as well get out of dairying into beef cattle."

From Denmark the practice of keeping records has spread to many countries. It has been adopted in this State by some of the leading breeders of pedigree stock, under the control of the Department of Agriculture, but, apart from that, there are only one or two herd-testing societies.

Some of the principal advantages of the system might be summarized as follows:—

1. Detecting the unprofitable cows.—Records tell the dairyman exactly the milk and fat production of each individual cow. He can thus identify the animals that are systematically giving poor results, and by weeding them out, prevent the economic loss of keeping cows that are not paying for the time, feed, and labour devoted to them.

2. Recording of performance for breeding purposes.—Milking qualities, as with other characteristics, are hereditary. It is, therefore, of

prime importance that the farmer should know the heavy milkers to select for breeding purposes. Milking qualities are also transmitted through the bull. It is, therefore, necessary to show that he is descended from a strain of heavy milkers.

3. Testing for economy in feeding.—Dairymen are commencing to pay more attention to hand-feeding. Where records are kept, the influence of different foods on the milk yield can be noticed. It is quite possible to use expensive foods without a corresponding increase in the milk output. Rational feeding is an essential factor in the productiveness of the herd.

4. Records are a guide to health of the herd.—One of the first symptoms of an ailing cow is a diminished milk flow; therefore, any reduction in the yield will be seen and investigation may lead to the detection of a sick cow.

5. Testing for efficiency in milking.—Irregular yields are sometimes due to carelessness on the part of the milker. Records will show all irregularities of yield, so that steps can be taken for their correction.

6. A check against low quality milk.—Records enable the milk seller to know exactly the amount of fat in the milk, and thus he may avoid prosecution for selling milk under the standard set by the pure food regulations. It is also a check against adulteration of milk after leaving the farm.

7. Places dairying on a business footing.—Records are the farmer's guide to systematic dairying and the surest way, in fact, the only way, of ascertaining the profit and loss on every cow on the farm.

8. Educational value of records.—The interest of the farmer in his work is increased. The faculty of observation is awakened and the work lifted from mere drudgery to an interesting study of cause and effect in milk production. Impetus is also given to further study based on rational principles.

The influence of records on the sale of stock must not be overlooked. The writer attended several sales a few months ago in the south-west counties of England and some Ayrshire sales in Scotland. In some cases the official records of the cows being sold were given. These cows realized as high as £20 more than those whose productivity at the bucket was unknown. The same thing was noticed in Scandinavian countries, where the price is largely regulated by an authenticated record of the cow's productivity.

The organization of farmers into District Herd Testing Associations is undoubtedly the best method of dealing with the question. The figures then have an official recognition. The testing would be done and the records kept by an experienced and reliable man, and the danger from abuses safeguarded.

Pending the development of such organizations, every farmer should keep his own records. In their simplest form they do not mean any great cost or much difficulty. The essential requirements are a Babcock tester outfit and a spring balance, conveniently placed, on which a bucket can be hung. The weights are tabulated on a chart specially ruled for the purpose. The testing is a simple matter, and any intelligent dairyman can easily learn to use the tester properly. Great care must

be exercised to get an accurate sample. If the trouble of daily weighing of each cow's milk is found to be irksome, approximately accurate results can be obtained by weighing the morning and evening milk once a week and averaging the result. It has been found from experiments in Denmark, Ireland, and America that the difference between the average figures obtained by daily weighing and those of any one day is not likely to be more than 3 per cent. If such records are kept faithfully, the dairy farmer is in possession of the only reliable information that will enable him to distinguish between his superior and inferior cows.

Recent information from New Zealand published in the *Leader* shows how fallible any other method is. An official of the New Zealand Department of Agriculture, in order to show dairymen do not know the respective merit of their cows, asked members of various organizations to select their eight best cows and place them in order of merit before the season's testing commenced. One man placed a cow giving 140 lbs. of fat ahead of one producing 176 lbs. Another man preferred one producing 289 lbs. of fat to one producing 507 lbs. In a number of instances dairymen selected as amongst their eight best cows certain animals which, at the end of the season, had to be culled. Comment on results like these is unnecessary.

Weeding out wasters by the aid of records, the use of a "tested" pure bred bull on selected cows, and rational feeding constitute the "triple alliance" that will place dairying on an economical and sound basis.

THE CARINGBERRY.

Reference was made in the article on Small Fruits which appeared in the issue of this Journal for October last to a much advertised berry which, it was claimed by the advertisers, was a cross between the mulberry, raspberry and blackberry. It was pointed out by the writer that the claim made was ridiculous, as such a cross was impossible. Several growers purchased a few plants last year at a high price and all are disappointed. The illustration on the opposite page shows the supposed new berry, called the caringberry and, beside it, the common loganberry. The specimens were taken from plants of the same age. The plants appear alike in every respect, and it may be stated with confidence that the caringberry and loganberry are identical.

Spray from Bush Sold Under the Name of "Caringberry."

Spray from Loganberry Bush.

ARTIFICIAL FERTILIZERS.

List of Fertilizers Registered under the Artificial Fertilizers Act for the Year 1921.

By P. Rankin Scott, Chemist for Agriculture.

REGISTRATION OF BRANDS.

The Artificial Fertilizers Act requires that all manufacturers and importers of fertilizers submit for registration on or before the 1st November in each year a brand for each fertilizer they intend offering for sale during the following year.

In addition to his full name and place of business and the figure, trade mark or sign to be associated with the fertilizer to identify it, each applicant is required to give a statement of the percentage composition of the fertilizer for which registration is desired in respect of its nitrogen, phosphoric acid and potash, showing the forms in which they occur and the retail price of the fertilizer. The list of registered brands that have been accepted is to be found on page 52 of this issue. The term "form" has reference to the combination of the fertilizing constituent with other constituents. On the combination of the elements composing the fertilizer the availability of the fertilizer largely depends. A fertilizer according to the Act is any material containing nitrogen, phosphoric acid or potash which has been manufactured, produced or prepared in any manner for the purpose of fertilizing the soil or supplying nutriment to the plant.

UNIT VALUES.

The unit values are calculated each year from the brands of the simple fertilizers registered. Such values constitute the basis for calculating the values of all fertilizers for the period during which the registered brands continue in force. They also serve the buyer by affording him the means of comparing the prices of the different fertilizers registered. It may be pointed out that in the case of mixed fertilizers no allowance has been made for the extra cost of handling and mixing incurred by the manufacturer; only the actual value of the constituents which have a commercial value are taken into account. The commercial value of any fertilizer may be ascertained by multiplying the percentage of nitrogen, phosphoric acid or potash as stated on the label or on the invoice certificate issued by the vendor on the purchase of the fertilizer by the unit value fixed for the form in which it occurs in the fertilizer and adding together the result.

TABLE OF UNIT VALUES FOR 1921.

	Per Unit. £	s.	d.
Nitrogen, as Nitrate	1	19	0
„ Bone and Flesh	1	10	0
„ Bone and Blood	1	10	0
„ Blood	1	7	0
„ Ammonia	0	18	10
„ Unspecified	1	5	0
„ in Fine Bone	1	7	0
„ Coarse Bone	1	5	0

TABLE OF UNIT VALUES FOR 1921—*continued.*

	Per Unit. £	*s.*	*d.*
Phosphoric Acid, as Water Soluble	0	7	0
,, ,, Citrate Soluble	0	6	0
,, ,, ,, Insoluble in Superphosphates	0	1	0
,, ,, ,, ,, Nitro-supers	0	1	0
,, ,, ,, ,, Basic Phosphates	0	1	0
,, ,, ,, ,, Complete Manures	0	1	0
,, ,, ,, ,, Market Garden Manure	0	1	0
,, ,, ,, ,, Bone and Super	0	4	0
,, ,, ,, ,, Bone Fertilizers	0	4	0
,, ,, ,, ,, Roasted and Finely Ground Phosphates	0	4	3
,, ,, ,, ,, Ground Rock Phosphate	0	3	6
,, ,, in Fine Bone	0	6	0
,, ,, Coarse Bone	0	4	0
Potash, as Muriate	0	11	8

The following examples may be of service by way of illustration of the method of calculating the values :—

SUPERPHOSPHATE.

Analysis.		Unit Value. *s.*	*d.*		£	*s.*	*d.*
Phosphoric Acid, Water Soluble...	17.00% ×	7	0	=	5	19	0
Phosphoric Acid, Citrate Soluble	0.50% ×	6	0	=	0	3	0
Phosphoric Acid, Citrate Insoluble	0.50% ×	1	0	=	0	0	6
Calculated value per ton					£6	2	6

BONEDUST.

	Analysis.
Nitrogen	3.60%
Phosphoric Acid	18.66%
	Mechanical Condition.
Fine Bone	37.20%
Coarse Bone	62.80%

Calculation—	Percentage of Nitrogen × Fine Bone.	Percentage of Nitrogen in Fine Bone.	Unit Value. *s.*	*d.*	£	*s.*	*d.*
Nitrogen in fine bone	$\frac{3.60\% \times 37.20\%}{100}$	= 1.34% ×	27	0	1	16	2
Nitrogen in coarse bone	$\frac{3.60\% \times 62.80\%}{100}$	= 2.26% ×	25	0	2	16	6
Phosphoric Acid in fine bone	$\frac{18.66\% \times 37.20\%}{100}$	= 6.95% ×	6	0	2	1	8
Phosphoric Acid in coarse bone ...	$\frac{18.66\% \times 62.80\%}{100}$	= 11.71% ×	4	0	2	6	10
Calculated value per ton					£9	1	2

LIST OF FERTILIZERS REGISTERED AT THE OFFICE OF THE DIRECTOR OF AGRICULTURE UNDER THE FERTILIZERS ACT 1915 (No. 2652) FOR THE YEAR 1921.

Description of Fertilizer.	Brand	Nitrogen.					Phosphoric Acid.	Potash.	Price asked for the Fertilizer per ton.	Where Obtainable.
		As Nitrate.	As Ammonia.	As Blood.	Unspecified.	Total.				
Mainly Nitrogenous.		%	%	%	%	%	%	%	£ s. d.	
Nitrate of Soda ..	Federal Manure (S.N.)	15·50	..	..	..	15·50		..	30 0 0	The Australian Explosives and Chemical Co. Ltd., 135 William-street, Melbourne
.. .. ..	"Sickle" Nitrate of Soda	15·50	..	..	..	15·50		..	30 0 0	Cuming, Smith, and Co. Pty. Ltd., 65 William-street, Melbourne
.. .. ..	M.L. Mt. Lyell Nitrate of Soda	15·50	..	..	..	15·50		..	30 0 0	Mt. Lyell Mining and Railway Co. Ltd., 381 Little Collins-street, Melbourne
.. .. ..	Wischer & Co. Pty. Ltd.	15·50	..	..	..	15·50		..	30 0 0	Wischer and Co. Pty. Ltd., 153 William-street, Melbourne
Sulphate of Ammonia	B.G. Co. Sulphate of Ammonia	..	20·90	..	..	20·90	..	..	18 0 0	The Ballarat Gas Co., Ballarat
.. ..	M.G. Co. Sulphate of Ammonia	..	20·59	..	..	20·59	..	..	18 0 0	The Metropolitan Gas Co., Flinders-street, Melbourne
.. ..	M.L. Mt. Lyell ..	..	20·00	..	..	20·00		..	20 0 0	Mt. Lyell Mining and Railway Co. Ltd., 381 Little Collins-street, Melbourne,
..	Wischer & Co. Pty. Ltd. ..	..	20·00	..	..	20·00	..	..	20 0 0	Wischer and Co. Pty. Ltd., 153 William-street, Melbourne
.. ..	Sickle Brand ..	..	20·00	..	..	20·00		..	20 0 0	Cuming, Smith, and Co. Pty. Ltd., 65 William-street, Melbourne
.. ..	Federal Manure (A.S.)	..	20·00	..	..	20·00	..	..	20 0 0	The Australian Explosives and Chemical Co. Ltd., 135 William-street Melbourne
.. ..	C.G.A.F. Sulphate of Ammonia	..	20·59	..	..	20·59	..	..	18 0 0	Colonial Gas Association Ltd., Whitehall-street, Footscray
Dried Blood ..	M.C.C. Blood Manure	..	..	8·95	..	8·95	1·46	0·65	9 0 0	Melbourne City Council, Smithfield-road, Kensington
.. .. ..	Rohs Bendigo Blood Manure	..	..	9·50	..	9·50	..	..	14 0 0	P. Rohs Pty. Ltd., Bridge-street, Bendigo
.. .. ..	Imperial Dried Blood Manure	..	..	11·00	..	11·00		..	18 0 0	W. Angliss and Co. Pty. Ltd., 42 Bourke-street, Melbourne
Castor Meal .	Wischer & Co. Pty. Ltd.	..	..	..	4·00	4·00	..	..	5 0 0	Wischer and Co. Pty. Ltd., 153 William-street, Melbourne
.. .. ..	M.L. Mt. Lyell ..	..	..	..	4·00	4·00		.	5 0 0	Mt. Lyell Mining and Railway Co. Ltd., 381 Little Collins-street, Melbourne

LIST OF FERTILIZERS REGISTERED AT THE OFFICE OF THE DIRECTOR OF AGRICULTURE UNDER THE FERTILIZERS ACT 1915 (No. 2652) FOR THE YEAR 1921—*continued.*

Description of Fertilizer.	Brand.	Nitrogen.					Phosphoric Acid.	Potash.	Price asked for the Fertilizer per ton.	Where Obtainable.
		As Nitrate.	As Ammonia.	As Blood.	Unspecified.	Total.				
Mainly Nitrogenous—continued.		%	%	%	%	%	%	%	£ s. d.	
Castor Meal ..	Sickle Brand ..	..	..	..	4·00	4·00	..	..	5 0 0	Cuming, Smith, and Co. Pty. Ltd., 65 William-street, Melbourne
,, ,, ..	Federal Manure ..	..	..	..	4·00	4·00	..	..	5 0 0	The Australian Explosives and Chemical Co. Ltd., 135 William-street, Melbourne
,, ,, ..	"Alba" Castor Meal	..	..	..	3·50	3·50	..	..	Not retailed	Lycett Proprietary Ltd., Normanby-road, South Melbourne
Mainly Potassic.										
Muriate of Potash ..	Wischer & Co. Pty. Ltd.	..	..	..	..	..	..	58·00	35 0 0	Wischer and Co. Pty. Ltd., 153 William-street, Melbourne
,, ,, ..	Federal Manure (P.M.)	..	..	..	..	..	..	58·00	35 0 0	The Australian Explosives and Chemical Co. Ltd., 135 William-street, Melbourne
,, ,, ..	Sickle Brand ..	..	..	..	..	..	..	58·00	35 0 0	Cuming, Smith, and Co. Pty. Ltd., 65 William-street, Melbourne
,, ,, ..	M.L. Potash ..	..	..	..	..	..	..	58·00	35 0 0	Mt. Lyell Mining and Railway Co. Ltd., 381 Little Collins-street, Melbourne
,, ,, ..	D & C Muriate of A Potash	..	..	..	..	..	..	52·014	29 0 0	Dalgety and Co. Ltd., 461–471 Bourke-street, Melbourne
,, ,, ..	D & C Muriate of M Potash	..	..	..	..	..	..	58·06	31 0 0	Dalgety and Co. Ltd., 461–471 Bourke-street, Melbourne

LIST OF FERTILIZERS REGISTERED AT THE OFFICE OF THE DIRECTOR OF AGRICULTURE UNDER THE FERTILIZERS ACT 1915 (No. 2652) FOR THE YEAR 1921—*continued.*

Description of Fertilizer.	Brand.	Nitrogen.					Phosphoric Acid.				Potash.	Price asked for the Fertilizer per ton.	Where Obtainable.
		As Nitrate.	As Ammonia.	As Blood.	Unspecified.	Total.	Water Soluble.	Citrate Soluble.	Citrate Insoluble	Total.			
Mainly Phosphatic.													
Readily Soluble.							%	%	%	%		£ s. d.	
Superphosphate ..	Wischer & Co. Pty. Ltd. Superphosphate No. 1	..	..	..	..	..	17·00	0·50	0·50	18·00	..	6 3 0	Wischer and Co. Pty. Ltd., 153 William-street, Melbourne
,, ..	M.L. Mt. Lyell No. 1 Super.	..	..	..	..	..	17·00	0·50	0·50	18·00	..	6 3 0	Mt. Lyell Mining and Railway Co. Ltd., 381 Little Collins-street, Melbourne
,, ..	Sickle Brand Florida Super.	..	..	..	..	..	17·00	0·50	0·50	18·00	..	6 3 0	Cuming, Smith, and Co. Pty. Ltd., 65 William-street, Melbourne
,, ..	Federal Manure (O.S.)	..	..	..	..	..	17·00	0·50	0·50	18·00	..	6 3 0	The Australian Explosives and Chemical Co. Ltd., 135 William-street, Melbourne
,, ..	Hasell's Superphosphate	..	..	..	..	..	17·00	0·50	0·50	18·00	..	6 3 0	A. H. Hasell, 17 Queen-street, Melbourne
Moderately Soluble.													
Superphosphate and Lime	Wischer & Co. Basic Phosphate	..	..	..	..	..	..	14·00	3·00	17·00	..	5 12 6	Wischer and Co. Pty. Ltd., 153 William-street, Melbourne
,, ,,	M.L. Mt. Lyell Basic Phosphate	..	..	..	..	..	..	14·00	3·00	17·00	..	5 12 6	Mt. Lyell Mining and Railway Co. Ltd., 381 Little Collins-street, Melbourne
,, ,,	Sickle Brand Basic Phosphate	..	..	..	..	..	..	14·00	3·00	17·00	..	5 12 6	Cuming, Smith, and Co. Pty. Ltd., 65 William-street, Melbourne
,, ,,	Federal B.P. Basic Phosphate	..	..	..	..	..	..	14·00	3·00	17·00	..	5 12 6	The Australian Explosives and Chemical Co. Ltd., 135 William-street, Melbourne

LIST OF FERTILIZERS REGISTERED AT THE OFFICE OF THE DIRECTOR OF AGRICULTURE UNDER THE FERTILIZERS ACT 1915 (No. 2652) FOR THE YEAR 1921—*continued.*

Description of Fertilizer.	Brand.	Nitrogen.				Phosphoric Acid.				Potash.	Price asked for the Manure per ton.	Where Obtainable.
		As Ammonia.	As Blood, Flesh and Bone.	Unspecified.	Total.	Water Soluble.	Citrate Soluble.	Citrate Insoluble.	Total.			
		%	%	%	%	%	%	%	%	%	£ s. d.	
Mainly Phosphatic—Slowly Soluble. Ground Rock Phosphate ..	Federal Manure G.P. Ground Phosphate	..	..	..	..	..	..	36·65	36·65	..	6 0 0	The Australian Explosives and Chemical Co. Ltd., 135 William-street, Melbourne
.. ..	Sickle Brand Ground Phosphate 50 %	..	..	..	..	..	..	23·00	23·00	..	4 7 6	Cuming, Smith, and Co. Pty. Ltd., 65 William-street, Melbourne
.. ..	Sickle Brand Ground Phosphate 60 %	..	..	..	..	..	..	27·50	27·50	..	5 0 0	.. ..
.. ..	Sickle Brand Ground Phosphate 80 %	..	..	..	..	..	..	36·65	36·65	..	6 0 0	.. ..
.. ..	M.L. Mt. Lyell Ground Phosphate 50 %	..	..	..	..	..	..	23·00	23·00	..	4 7 6	Mt. Lyell Mining and Railway Co. Ltd., 381 Little Collins-street, Melbourne
.. ..	M.L. Mt. Lyell Ground Phosphate 60 %	..	..	..	..	..	..	27·50	27·50	..	5 0 0	.. ..
.. ..	M.L. Mt. Lyell Ground Phosphate 80 %	..	..	..	..	..	.	36·65	36·65	..	6 0 0	.. ..
.. ..	Wischer & Co. Ground Phosphate 50 %	..	..	..	..	..	..	23·00	23·00	..	4 7 6	Wischer and Co. Pty. Ltd., 153 William-street, Melbourne
.. ..	Wischer & Co. Ground Phosphate 60 %	..	..	..	..	..	..	27·50	27·50	..	5 0 0	.. ..
.. ..	Wischer & Co. Ground Phosphate 80 %	..	..	..	..	..	..	36·65	36·65	..	6 0 0	.. ..
.. ..	Hasell's Marion Ground Phosphate 60 %	..	..	..	..	..	..	27·50	27·50	..	5 10 0	A. H. Hasell, 17 Queen-street, Melbourne
.. ..	Victoria Phosphate (roasted and intensely ground)	..	..	..	..	..	3·00	12·00	15·00	..	3 8 6	The Phosphate Co-operative Co. of Australasia Ltd., 545 Little Collins-street, Melbourne
.. ..	Victoria Phosphate No. 3 (unroasted coarsely ground)	..	..	..	..	..	..	14·00	14·00	..	2 2 0	.. ..
.. ..	Victoria Phosphate No. 4 (unroasted coarsely ground)	..	..	..	..	..	..	11·00	11·00	..	1 14 0	.. ..

LIST OF FERTILIZERS REGISTERED AT THE OFFICE OF THE DIRECTOR OF AGRICULTURE UNDER THE FERTILIZERS ACT 1915 (No. 2652) FOR THE YEAR 1921—*continued.*

Description of Fertilizer.	Brand.	Nitrogen.				Phosphoric Acid.				Potash.	Price asked for the Manure per ton.	Where Obtainable
		As Ammonia.	As Blood, Flesh and Bone.	Unspecified.	Total.	Water Soluble.	Citrate Soluble.	Citrate Insoluble.	Total.			
Mixed Manure, containing Nitrogen, but mainly Phosphatic.		%	%	%	%	%	%	%	%	%	£ s. d.	
Superphosphate and Sulphate of Ammonia	Federal Manure T.D. Nitro Superphosphate	1·55	..	..	1·55	15·30	0·45	0·45	16·20	..	7 10 0	The Australian Explosives and Chemical Co. Ltd., 135 William-street, Melbourne
Superphosphate, blended with Ammonia, Bone, and Rock Phosphate	Federal Manure N.S. Nitro Superphosphate	1·50	0·50	..	2·00	13·18	0·38	1·71	15·27	..	8 0 0	" " " "
Superphosphate and Sulphate of Ammonia	Sickle Brand Nitro Super. T.D.	1·55	..	..	1·55	15·30	0·45	0·45	16·20	..	7 10 0	Cuming, Smith, and Co. Pty. Ltd., 65 William-street, Melbourne
" "	M.L. Mt. Lyell Nitro Super. No. 2	1·55	..	..	1·55	15·30	0·45	0·45	16·20	..	7 10 0	Mt. Lyell Mining and Railway Co. Ltd., 381 Little Collins-street, Melbourne
" "	Wischer & Co. Pty. Ltd. Top-dressing Manure	1·55	..	..	1·55	15·30	0·45	0·45	16·20	..	7 10 0	Wischer and Co. Pty. Ltd., 153 William-street, Melbourne
Superphosphate, blended with Sulphate of Ammonia and Bone	Wischer & Co. Pty. Ltd. Nitro Superphosphate	1·50	0·50	..	2·00	13·00	0·39	1·61	15·00	..	8 0 0	" " " "
Superphosphate, blended with Sulphate of Ammonia and Blood	M.L. Mt. Lyell Nitro Super.	1·50	0·50	..	2·00	13·00	0·38	1·37	14·75	..	8 0 0	Mt. Lyell Mining and Railway Co. Ltd., 381 Little Collins-street, Melbourne
Superphosphate, blended with Sulphate of Ammonia, Bone and Blood	Sickle Brand Nitro Super.	1·50	0·50	..	2·00	13·00	0·39	1·61	15·00	..	8 0 0	Cuming, Smith, and Co. Pty. Ltd., 65 William-street, Melbourne
Superphosphate, Sulphate of Ammonia, Bone and Blood, and Castor Meal	Federal Manure M.G. (Market Garden)	1·50	1·38	1·12	4·00	7·22	1·79	2·99	12·00	..	9 0 0	The Australian Explosives and Chemical Co. Ltd., 135 William-street, Melbourne
.. .. ..	Sickle Brand Market Garden Manure	1·50	1·38	1·12	4·00	7·22	1·79	2·99	12·00	..	9 0 0	Cuming, Smith, and Co. Pty. Ltd., 65 William-street, Melbourne

LIST OF FERTILIZERS REGISTERED AT THE OFFICE OF THE DIRECTOR OF AGRICULTURE UNDER THE FERTILIZERS ACT 1915 (No. 2652) FOR THE YEAR 1921—*continued.*

Description of Fertilizer.	Brand.	Nitrogen.				Phosphoric Acid.				Potash.	Price asked for the Manure per ton.	Where Obtainable.
		As Ammonia.	As Blood, Flesh and Bone.	Unspecified.	Total.	Water Soluble.	Citrate Soluble.	Citrate Insoluble.	Total.			
Mixed Manure, &c.—continued.		%	%	%	%	%	%	%	%	%	£ s. d.	
Superphosphate, Sulphate of Ammonia, Bone and Blood, and Castor Meal	M.L. Mt. Lyell Market Garden Manure	1·50	1·38	1·12	4·00	7·22	1·79	2·99	12·00	..	9 0 0	Mt. Lyell Mining and Railway Co. Ltd., 381 Little Collins-street, Melbourne
,, ,,	Wischer & Co. Pty. Ltd. Market Garden Manure	1·50	1·38	1·12	4·00	7·22	1·79	2·99	12·00	..	9 0 0	Wischer and Co. Pty. Ltd., 153 William-street, Melbourne
Superphosphate, Sulphate of Ammonia, Muriate of Potash, and Castor Meal	Wischer & Co. Pty. Ltd. No. 1 Complete Manure	1·50	..	1·00	2·50	10·20	0·30	0·30	10·80	7·25	11 0 0	,, ,, ,, ,,
,, ,,	Wischer & Co. Pty. Ltd. No. 2 Complete Manure	1·00	..	1·00	2·00	10·20	0·20	0·30	10·80	4·64	8 17 6	,, ,, ,, ,,
,, ,,	M.L. Mt. Lyell No. 1 Complete Manure	1·50	..	1·00	2·50	10·20	0·30	0·30	10·80	7·25	11 0 0	Mt. Lyell Mining and Railway Co. Ltd., 381 Little Collins-street, Melbourne
,, ,,	M.L. Mt. Lyell No. 2 Complete Manure	1·00	..	1·00	2·00	10·20	0·30	0·30	10·80	4·64	8 17 6	,, ,, ,, ,,
,, ,,	Sickle Brand No. 1 Complete Manure	1·50	..	1·00	2·50	10·20	0·30	0·30	10·80	7·25	11 0 0	Cuming, Smith, and Co. Pty. Ltd., 65 William-street, Melbourne
,, ,,	Sickle Brand No. 2 Complete Manure	1·00	..	1·00	2·00	10·20	0·30	0·30	10·80	4·64	8 17 6	,, ,, ,, ,,
,, ,,	Federal Manure No. 1 Complete Manure	1·50	..	1·00	2·50	10·20	0·30	0·30	10·80	7·25	11 0 0	The Australian Explosives and Chemical Co. Ltd., 135 William-street, Melbourne
,, ,,	Federal Manure No. 2 Complete Manure	1·00	..	1·00	2·00	10·20	0·30	0·30	10·80	4·64	8 17 6	,, ,, ,, ,,

LIST OF FERTILIZERS REGISTERED AT THE OFFICE OF THE DIRECTOR OF AGRICULTURE UNDER THE FERTILIZERS ACT 1915 (No. 2652) FOR THE YEAR 1921—*continued.*

Description of Fertilizer.	Brand.	Nitrogen.				Phosphoric Acid.				Price asked for the Manure per ton.			Where Obtainable.
		As Ammonia.	As Blood, Flesh and Bone.	Unspecified.	Total.	Water Soluble.	Citrate Soluble.	Citrate Insoluble.	Total.				
Mixed Manure, containing Nitrogen and Phosphoric Acid, Moderately Soluble.		%	%	%	%	%	%	%	%	£	s.	d.	
Superphosphate, with Blood, and Flesh and Bone	Wischer & Co. Pty. Ltd. Super. and Bone No. 2	..	0·75	..	0·75	12·75	1·37	3·38	17·50	7	7	6	Wischer and Co. Pty. Ltd., 153 William-street, Melbourne
Superphosphate, with Blood, Flesh and Bone, and Ground Phosphate	M.L. Mt. Lyell Super. and Bone No. 2	..	0·75	..	0·75	12·75	1·38	3·37	17·50	7	7	6	Mt. Lyell Mining and Railway Co. Ltd., 381 Little Collins-street, Melbourne
Superphosphate, with Blood, Flesh and Bone	Sickle Brand Super. and Bone (C)	..	0·75	..	0·75	12·75	1·37	3·38	17·50	7	7	6	Cuming, Smith, and Co. Pty. Ltd., 65 William-street, Melbourne
Superphosphate, with Blood, Flesh and Bone, and Ground Phosphate	Federal Manure B.S. No. 3 Super. and Bone	..	0·75	..	0·75	12·75	1·13	3·62	17·50	7	7	6	The Australian Explosives and Chemical Co. Ltd., 135 William-street, Melbourne
Superphosphate, with Bones and Animal refuse	Gardiner's Bone and Superposphate	..	1·39	..	1·39	3·20	5·80	8·00	17·00	7	15	0	George Gardiner and Co. Pty. Ltd., Marshall, Geelong
Superphosphate, with Blood and Bone	Rohs' Bendigo Blood, Bone, and Super.	..	4·00	..	4·00	5·50	6·25	2·25	14·00	10	10	0	P. Rohs Pty. Ltd., Bridge-street, Bendigo
Superphosphate, with Bonedust	Rohs' Bendigo Bonedust and Superphosphate	..	1·50	..	1·50	8·50	5·25	4·25	18·00	8	15	0	" " " "
Abattoir Refuse	Imperial Blood and Bone Manure	..	4·75	..	4·75	..	7·00	8·00	15·00	14	0	0	W. Angliss and Co. Pty. Ltd., 42 Bourke-street, Melbourne
" "	Hasell's Bone and Blood Fertilizer	..	7·18	..	7·18	..	5·08	5·00	10·08	12	10	0	A. H. Hasell, 17 Queen-street, Melbourne
Bones and Animal Refuse ..	Gardiner's Special Magic Fertilizer	..	5·00	..	5·00	..	3·00	10·00	13·00	8	5	0	George Gardiner and Co. Pty. Ltd., Marshall, Geelong
Bonedust and Blood ..	Rohs' Bendigo Bonedust and Blood	..	6·00	..	6·00	..	3·00	6·00	9·00	12	0	0	P. Rohs Pty. Ltd., Bridge-street, Bendigo
Bonedust, blended with cheaper materials	No. 1 Magic Bone Fertilizer	..	2·00	..	2·00	..	2·00	15·00	17·00	7	10	0	George Gardiner and Co. Pty. Ltd., Marshall, Geelong
" " "	No. 2 Magic Bone Fertilizer	..	1·50	..	1·50	..	1·50	14·50	16·00	7	2	6	" " " "
" " "	Samson's Bone Fertilizer ..	..	2·00	..	2·00	..	2·00	15·00	17·00	7	10	0	" " " "
" " "	Bailey Bros. Bone Fertilizer	..	2·50	..	2·50	..	6·50	9·50	16·00	8	0	0	Bailey Bros., 155 Main-street, Ballarat
" " "	A.N.A. Surprise Animal Fertilizer	..	3·00	..	3·00	..	4·00	12·00	16·00	10	0	0	G. W. Pennell, Braybrook
" " "	Ark Bone Fertilizer ..	..	3·16	..	3·16	..	3·66	15·60	19·26	7	0	0	Arthur Murphy, Barkly-street, Ararat

LIST OF FERTILIZERS REGISTERED AT THE OFFICE OF THE DIRECTOR OF AGRICULTURE UNDER THE FERTILIZERS ACT 1915 (No. 2652) FOR THE YEAR 1921—*continued.*

Description of Fertilizer.	Brand.	Nitrogen.				Phosphoric Acid.	Mechanical Condition.		Price asked for the Manure per ton.	Where Obtainable.
		As Ammonia.	As Blood, Flesh and Bone.	Unspecified.	Total.		Fine.	Coarse.		
Bonedust, containing Nitrogen and Phosphoric Acid, Moderately Soluble.		%	%	%	%	%	%	%	£ s. d.	
Bonedust	Horseshoe Brand Bonedust	..	3·50	..	3·50	15·40	25·00	75·00	8 10 0	P. Fitzgerald and Sons, Warragul-road, Bentleigh
"	Vauxhall Bonedust ..	..	3·86	..	3·86	23·25	33·7	66·3	8 10 0	William Moore, Panmure
"	Rohs' Bendigo Bonedust ..	..	4·00	..	4·00	18·00	55·00	45·00	10 0 0	P. Rohs Pty. Ltd., Bridge-street, Bendigo
"	Bailey Bros. Bonedust ..	..	3·00	..	3·00	18·00	30·00	70·00	9 0 0	Bailey Bros., 155 Main-street, Ballarat

BRICK LAYING A COW-SHED FLOOR.

A. J. Gill, Dairy Supervisor.

In most of the old-fashioned cowsheds, the floor of the bails consisted of a few slabs or stones, the main object being to keep the cows from bogging. The drainage soaked under this crude flooring, and made a foetid semi-liquid mass, which splashed up when one stepped suddenly on a stone slab. If a cow kicked, the filth was sent in all directions, with a good chance of some of it falling into the milk-bucket. There was usually a very objectionable smell in these cowsheds, which were excellent breeding grounds for disease spreading bacteria, bovine and human. It goes without saying that under these filthy conditions it was impossible to produce clean milk.

Where dairy farms are under the supervision of the Department of Agriculture, these foul-smelling insanitary floors have disappeared, the Government Supervisor always demanding that properly-drained impervious floors be put down and the surroundings kept clean. Usually

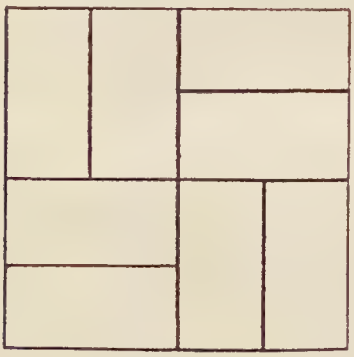


Diagram 1.
9-inch block system.
(2 bricks to 81 sq. inches).

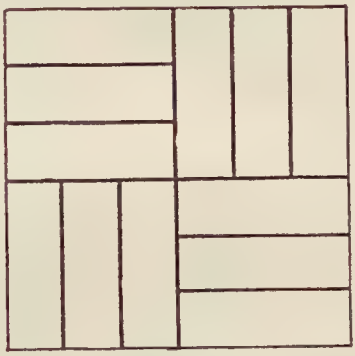


Diagram 2.
9-inch block system.
(3 bricks to 81 sq. inches).

concrete or brick floors are used. In the case of brick floors, unfortunately, through faulty laying, the grouting frequently breaks away, the floor becomes uneven, and the drainage, instead of running away, commences to soak underneath. Such floors have to be continually repaired, and are a source of annoyance and trouble to both the owner and the Dairy Supervisor.

Prevention being always better than cure, the following hints will be found of some assistance to those putting down brick floors, and their adoption will save a good deal of future worry and expense:—

The ground on which the bricks are to be laid should be carefully graded, and where depressions are filled in, the soil must be well rammed down—if gravel or broken stone can be used as filling so much the better. When the grading is finished cover the space with clean coarse sand to a depth of at least 2 inches. This makes an excellent foundation and facilitates the laying of the bricks. The grouting running down the bricks picks up a quantity of sand and makes the whole floor into a solid mass.

There are many different methods of laying bricks, but I think the best and one of the simplest is that known as the 9-inch block system (diagrams Nos. 1 and 2). Some bricklayers claim that this method is superior to any other for shed floors, as an animal will not slip so readily where this pattern is followed.

However, some people prefer to lay the bricks in rows. Where this is done, the joints should be broken as shown in diagram 3. A row of bricks along the wall of a shed or dairy with the outside edge raised from an inch to one and a-half inches makes the cleaning of the floor easier by doing away with corners.

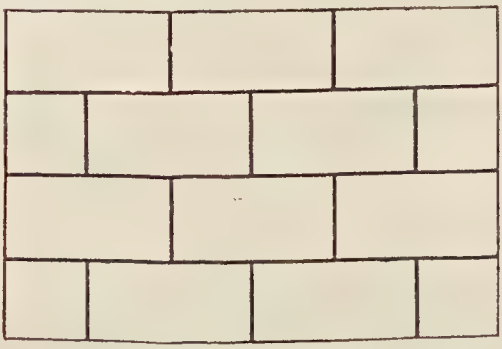


Diagram 3.
Bricks laid in rows with joint between.

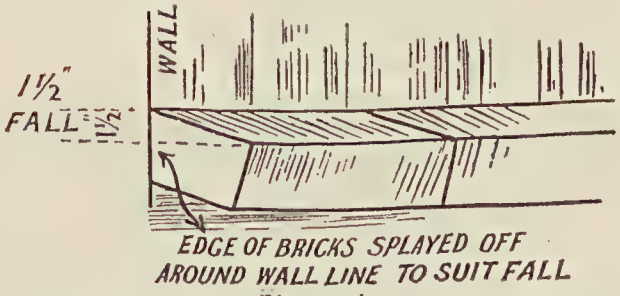


Diagram 4.
Bricks raised 1½ inches against wall in order to make floor easier to wash. (If bricks be laid on the flat, 32 bricks will cover a square yard—if laid on edge, 48 to the square yard).

The frog of the brick must be always turned down. I have noticed cases where people putting down brick floors for the first time turned the frogs up, thinking their cows would slip on the flat brick. If the frogs to be turned up, they will hold the drainage, and, consequently, it will be very difficult to keep the floors clean. Cows will rarely ever slip if allowed to walk in quietly. Should the floor become slippery, a shovelful or two of sand at the gateway will overcome the difficulty, as the cow will carry in sufficient sand on her hoofs to enable her to grip the floor.

The bricks should be laid loosely; usually the unevenness in their size will leave sufficient space for the grouting to run down. If the bricks are very even and well finished they may require spacing; in this case a quarter of an inch would be ample.

For grouting use cement mortar—1 part cement to 3 of sand. Before mixing the sand should be thoroughly washed; if there be any dirt in it, the grouting will not set. To wash sand—half fill a tub with it; add water and stir well; pour the dirty water off and add fresh water, and repeat this until the water remains clear; the sand will then be free from dirt. Mix the cement and sand thoroughly; then add water till the mixture is of the right consistency for grouting. Wet the bricks thoroughly; unless this be done the grouting will hang and not reach the bottom. The grouting can be swept over the bricks till it has found its way down every crevice; if a fine finish is desired a trowel may be used to smooth the joints. A floor put down this way will last almost a lifetime, and the grouting will wear the bricks out.

ORCHARD AND GARDEN NOTES.

E. E. Pescott, F.L.S., Pomologist.

The Orchard.

If the work has not already been done, the orchard should be kept in constant cultivation so as to conserve the abundant spring rains. Should the summer become hot and dry, this will be a very necessary precaution. Even where the soil had been previously well cultivated, the cultivators should again be run over the surface, as any hot weather will cause the soil to crust, which would be the means of dissipating a very considerable amount of soil water. Every effort should be taken to retain this moisture so that the fruit crops shall have all they require for their perfection. To further attain this end no weeds should be allowed to grow in orchard soils.

BUDDING.

Young trees, or old trees that have been previously cut down in preparation for budding, may be worked towards the end of the month. It is advisable to select dull, cool weather for this operation, so that the sap may run more freely, and that atmospheric conditions may not have too drying an effect on the bud. The operation of budding is a very simple one, and is easily performed. To gain a successful end, the sap should be flowing freely, so that when the cuts are made the bark should "lift" or "run" easily, and without any clinging or tearing of the fibres, and it should separate freely from the wood. The bud selected should be firm and well matured, and should show no signs of premature growth whatever. It should be cut from the scion with a shallow cut, and if any wood be left in the cutting it should be taken out of the bud. A smooth, clean spot should be selected on the bark of the stock, and a T-shaped cut made, the vertical cut being longer than the horizontal one. The bark at the point where the cuts meet should be raised, and the bud inserted between the bark and the wood of the stock. The bud should be gently pressed down into position, and then bound with soft twine, string, or raffia. If the bud be too long for the cut, the top may be cut off level by means of a horizontal cut. With practice it will soon become possible to take the buds so that they will need neither cutting nor trimming.

After two or three weeks the buds should be examined to see if they have "taken"—that is, if the bud has united thoroughly to the stock. When this occurs, the tie may be cut. If a growth be desired at once all wood above the bud may be cut off some short distance above the

bud, so as to prevent any bark splitting, and consequent loss of the bud, and so as to throw the bud out at a fair angle. Ultimately this should be properly trimmed.

If desired, the bud may be left dormant throughout the autumn and winter till spring. In this case the branch should not be cut off, but left on till the usual winter pruning.

SUMMER PRUNING.

The profuse spring rains have caused a vigorous growth in the fruit trees. In order to more economically utilize this abundant growth, it should be now summer pruned, particularly on the apple and pear trees. Care should be observed that as much of the leafage as possible is retained on the tree. Unduly long laterals of fruiting trees may be shortened back, always cutting to a leaf. Unnecessary terminal leader growths, of which there are sometimes three or four, all strong growing, may be reduced to one, retaining this one as a leader. In no case should this growth be cut or interfered with in any way.

The results of these cuts will be to divert the sap which was flowing into growths that would subsequently be pruned, into more profitable channels, so that weak buds and growths may be strengthened, and induced into fruit bearing.

The Vegetable Garden.

The work in this section is much the same as in the flower garden. Good mulching and regular soil stirring will be the work for the month. As soon as any bed is cleared of vegetables it should be manured and well dug over in preparation for the next crop. Deep digging is always desirable in vegetable growing. If any pest, such as aphis, or caterpillars, or tomato weevil, have been present, it would be advisable to burn all the crop refuse, or to destroy any insects that remain, and to give the plot a dressing of gypsum, or of Clift's manurial insecticide.

Keep the tomatoes well watered and manured, pinching out surplus and strong grown laterals. In early districts the onion crop will be ripening. In late districts, or with late crops, the ripening may be hastened by breaking down the top. An autumn crop of potatoes may be planted. Cabbage, cauliflower, lettuce, and celery plants may be planted out. Keep asparagus beds well watered.

The Flower Garden.

January should be a busy month in the garden. It may be necessary to water frequently, and after every watering the surface should be well loosened, and stirred with the hoe to keep it moist and cool. More cultivation and less water is a good rule to be observed. The hoe should be used more, and the hose less, in summer; greater benefits will accrue, and the water bill will be considerably reduced. Mulchings with straw, grass, &c., are very useful just now. The mowings from lawns form valuable mulching. Waste tobacco stems are also valuable as a mulch.

Dahlias, chrysanthemums, and other tall-growing, slender herbaceous plants will require support in the way of stakes. They will also need mulching considerably. These plants should receive no check whatever, and should be continued with a regular even growth right through the season. Another desideratum is that soils should be well drained, as plants of all descriptions thrive better in well-drained soils.

A sharp look-out should be kept on these plants for attacks of red spider. If this insect appears, a good spraying of tobacco solution or benzole emulsion should be given.

Constant watch will need to be kept for the various small caterpillars that attack the buds of these plants. Spraying with a weak solution of paris green and lime, or similar insecticide, will be useful. Hand-picking should also be resorted to.

Sow all kinds of hardy annuals, especially pansies, sweet peas, and iceland poppies.

REMINDERS FOR FEBRUARY.

Live Stock.

HORSES: *At grass.*—Supplement dry grass, if possible, with some greenstuff. Provide plenty of pure water and shade shelter. *In stable.*—Supplement hard feed with some greenstuff, carrots, or the like, and give a bran mash once a week at least. Avoid over-stimulating foods, such as maize and barley. Give hard feed in quantities only consistent with work to be performed. Stable should be well ventilated. and kept clean. When at work, give water at short intervals. Always water before feeding. Great benefit will result in supplying horses—more especially young ones running at grass—with a lick. The following one is recommended:—

Salt	20 parts
Lime	20 parts
Superphosphate	10 parts
Sulphate of iron	5 parts.

By having troughs constructed that will protect the lick from rain a considerable saving will be made.

Horses at grass require their feet attended to at frequent intervals, otherwise deformity of feet and lameness may result.

SHEEP.—In the case of very strong cross ewes, rams should not be removed until well on in this month, for this class, together with most pure ewes of British blood, are only now coming in season. To breed out this late lambing tendency, and to procure quality and quantity of wool as well as a good carcass, use carefully-bred, level-made merino rams. If the right type be not procurable at reasonable rates, use good Corriedales or Comebacks. Should there be among the rams any distinctly inferior to the others, keep them back for three weeks. Remember, narrow inferior rams are invariably the most active workers compared with sheep of more substance.

If feed conditions appear adverse. Keep salt available in all paddocks. Arrange for a hospital paddock. Select one watered by a trough and mix in Glauber salts. Pick out from time to time those sheep showing signs of impaction, and place "in hospital," removing them again later as appearances and circumstances direct. The effects of inferior dry feed and stagnant water are responsible later on for severe losses of both ewes and lambs, as well as for fly trouble at lambing.

If necessary to feed do not wait until in-lamb ewes are weak before commencing. Avoid moving good woolled sheep unnecessarily in heat and dust of summer.

Drench any weaners and young sheep scouring.

CATTLE.—Provide succulent feed and plenty of clean water easy of access; also shade and salt lick in trough. Have each cow's milk weighed and tested for butter fat regularly. Rear heifer calves from those that show profitable results. Give milk at blood heat to calves. Keep utensils clean or diarrhœa will result. Do not give too much at a meal for the same reason. Give half-a-cup of limewater per calf per day in the milk. Let them have a good grass run or lucerne, or half-a-pound of crushed oats in a trough. Dehorn all dairy calves except those required for stud or show purposes. Keep bulls away from cows. Crushed oats will now be the cheapest form of concentrates to feed to cows.

PIGS.—Sows about to farrow should be supplied with short bedding in well-ventilated styes. All pigs should be provided with shade and water to wallow in. There will be plenty of cheap feed available now, and there is a good margin between cost of feed and price for fat pigs. Read *Bulletin* No. 16, May, 1915. Pigs should be highly profitable animals to feed now.

Giant Kangaroo Rape

A Field of Giant Kangaroo Rape

Our Great Specialty

A VALUABLE Winter crop for pasturing sheep. Will fatten three more to the acre than any other variety. Easily cultivated, strong rapid grower, producing an abundance of highly nutritious and palatable green feed, greatly relished by all stock. A long, strong, tap root enables it to stand long periods of drought. Sow 4 to 6 lbs. per acre in drills, or 8 to 12 lbs. broadcast. Fresh stocks of this wonderful rape just arrived. Prices and samples on application.

"Mortgage Lifter" Oat

Wonderful results achieved during this last harvest. Write for full particulars, prices, &c.

Turnips and Swedes

Sow NOW! —— Write for our List.

Established over 70 years
Seed and Plant Merchants
139-141 Swanston St.
MELBOURNE

LAW SOMNER PTY. LTD.

Neptune "A" Prepared Spraying Oil

Contains over 85% of a heavy bodied Red Mineral Oil and is an absolutely deadly insecticide.

Neptune Lime and Sulphur

Is a concentrated Solution, and can be used even when the trees are in full bloom without harming the trees.

Berger's Arsenate of Lead

Will not scorch the trees or wash off, yet deadly to all parasites.

Spray your trees with **Neptune "A" Prepared Spraying Oil** during the winter months, following it up with **Lime and Sulphur** and **Arsenate of Lead,** and beautiful, clean, spotless fruit will be the inevitable result.

NEPTUNE OIL CO. Ltd. 10-12 QUEEN ST. MELBOURNE

FARMERS and GRAZIERS

NATURE helps those who help THEMSELVES.
FALLOW your land and RETAIN the MOISTURE.
Heavier Dressings of NATURE'S Plant Food.

"Federal" Superphosphate

Will Increase your Wheat Yield

Grass Lands TOP-DRESSED with "FEDERAL" SUPERPHOSPHATE yield more WOOL, a greater percentage of well-nourished LAMBS, and Increased Quantities of MILK.

Particulars supplied by

The Australian Explosives & Chemical Co. Ltd.

135 William Street.

'Phone: Central 4795 (two lines).

Works: DEER PARK, VICTORIA.

REGISTERED TRADE MARK

Works—
CURDIE'S RIVER

Telephone—Central 2807

"BULLDOG" Burnt & Unburnt (Ground Carbonate) Agricultural Lime

For Orchards, Crops, and Pastures

Its use is strongly recommended by all experts, and those who have had practical experience. Any quantity supplied at shortest notice.

For applying to land we recommend our "Ajax" Lime Spreader

Rates and full particulars from Distributors—

T. CURPHEY Pty. Ltd.

225 Coppin Street, Richmond, Victoria

BURNT LILYDALE LIME

FOR THE LAND

Farmers who have not used **Burnt Lime** should try it. The action of Burnt Lime on the land is **Immediate.** The demand for Building Lime having slackened owing to the War, Farmers have the opportunity of getting a supply of the **well-known Lilydale Lime.**

ANALYSIS go as high as 98% Calcium Oxide.

Apply—

DAVID MITCHELL ESTATE, Sole Proprietors, OLIVER'S LANE, MELBOURNE

Works—Cave Hill, Lilydale. Tel. Lilydale 4. **Tel. Central 5726.**

M.L.M

MEGGITT LIMITED'S
Pure Linseed Meal

Meggitt Limited have much pleasure in announcing that they are now able to accommodate orders for famous M.L.M. Linseed Oil Meal.

Although M.L.M. Linseed Meal will be supplied identical in quality with that which established "The Standard of Quality" in the past, we strongly recommend all owners of stock to advance with science and use our M.L.M. Specialized Stock Foods to obtain maximum results.

M.L.M. Stock Foods are scientifically balanced rations compounded on a basis of our famous Linseed Oil Meal, and contain the correct proportions of Protein, Carbohydrates, and Fats. Our M.L.M. Specialized Stock Foods are blended to suit the exact requirements of all classes of Stock and MUST give results.

All Stock Foods carry our M.L.M. guarantee, which is "The Standard of Quality."

Write for Booklet on Scientific Feeding to M.L.M. Stock Foods Department, D.H.

Agents:—Messrs. Harrisons, Ramsay Pty. Ltd., 666 Bourke Street, Melbourne.

Meggitt Limited

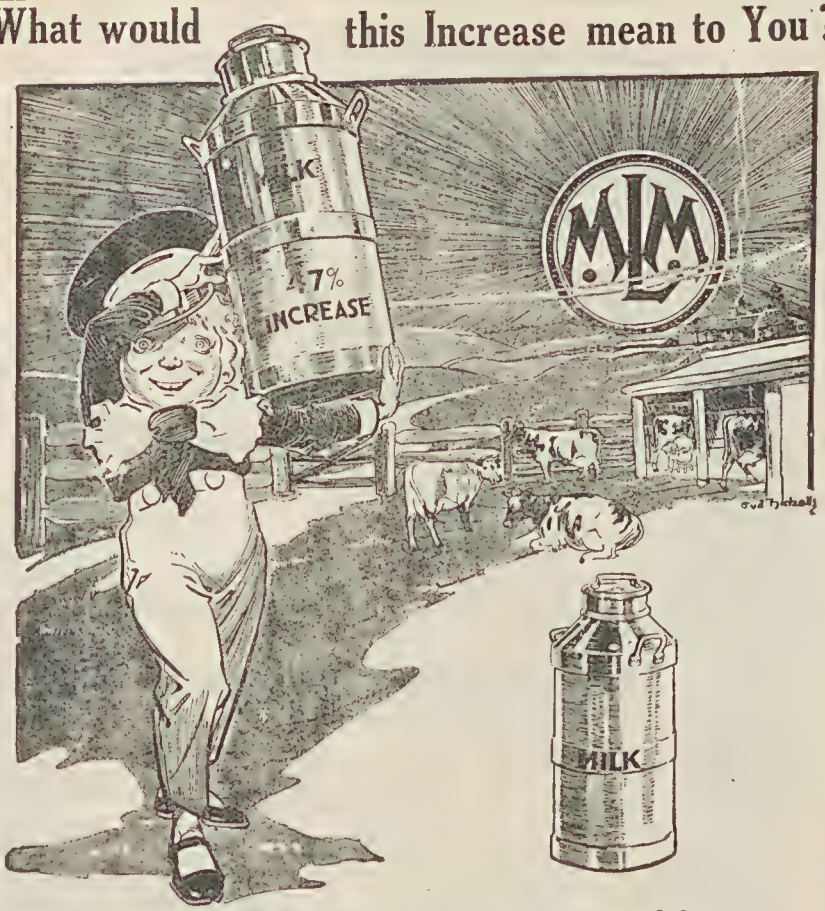
HEAD OFFICE 26 KING ST SYDNEY (Works: Parramatta)

"The boy on the bag guarantees quality"

Manufacturers of Linseed Oil, Meal, Cake, and Specialized Stock Foods.

"The boy on the bag guarantees quality"

What would this Increase mean to You?



An Illinois practical feeding experiment showed that cows fed with the properly balanced ration gave 47% more milk and more butterfat than others fed with the same quantity of unbalanced ration.

Every Stockowner is anxious for greater output.

We want him to know that to secure best results his stock MUST be supplied with properly-balanced foods.

To merely feed on stock grasses is not sufficient.

The Cow needs a milk-making ration high in protein, at the same time containing sufficient carbohydrates to provide body maintenance and energy.

Maximum production on pastures alone is impossible. Although they stimulate the milk flow, a concentrate rich in protein is necessary to balance the ration and increase both the weight and the productivity of the stock.

M.L.M. Cattle Food, "The Ideal Concentrate," fed as directed, is unequalled as an economical food. It furnishes the Ideal ration because it contains the essential food elements, is easily digested, and supplies necessary energy to turn feed into milk.

We cater for each class of stock raised for profit. Whether you be concerned with production of milk, beef, or eggs, the correct grade of M.L.M. Specialized Stock Foods will help you. They are correctly balanced and scientifically formulated and must give greater results.

Write for Booklet on Scientific Feeding to M.L.M. Stock Foods Department, D.H.

Agent: Messrs. Harrisons, Ramsay Pty. Ltd., 666 Bourke St., Melbourne

Meggitt Limited

HEAD OFFICE 26 KING ST SYDNEY (Works: Parramatta)

"The boy on the bag guarantees quality"

Manufacturers of Linseed Oil, Meal, Cake, and Specialized Stock Foods.

"The boy on the bag guarantees quality"

GARGOYLE
Spraying Oil.
HERE IS YOUR INSURANCE FOR NEXT SEASON.
Fifty per cent. of the fruit crop is lost annually, due to insects and disease. You can control these pests and ensure a perfect crop of clean, sound fruit, by using
Gargoyle Spraying Oil & Fungol
THE DUAL PURPOSE SPRAY
Fungol is packed separately, but must be used with GARGOYLE SPRAYING OIL
EASY TO MIX
EASY TO USE
GARGOYLE
If not obtainable from your Storekeeper, write direct to us.
SPRAYING OIL
Destroys Insects
Write us for free descriptive booklet, "The Care of Your Orchard."
S8
FUNGOL
Destroys Diseases
Fungol
VACUUM OIL COMPANY PTY. LIMITED.

PARSONS BROS. & CO.

Propy. Ltd.

OATMEAL, SPLIT PEAS, and
PEARL BARLEY MILLERS
and "CORNINA" MANUFACTURERS

ARE

BUYERS of OATS, PEAS, BARLEY, and MAIZE.

SEND SAMPLES OF YOUR GRAIN TO US.

BOX 53,
G.P.O., MELBOURNE.

The State Savings Bank
CREDIT FONCIER

Loans on Farms

Up to two-thirds of valuation in sums from £50 to £2,000, repayable by instalments spread over a period of 27½ years. Interest 6 per cent. per annum.

Special Terms for Discharged Soldiers and Dependants, also those who were in **Red Cross** and **Transport Services,** up to three-fourths of valuation, repayable by instalments spread over a period of 30¼ years. Interest 5¾ per cent.

NO CHARGE FOR MORTGAGE DEED

Application forms obtainable at any Branch of The State Savings Bank.

State Savings Bank,
Head Office—Elizabeth Street,
Melbourne

GEO. E. EMERY,
Inspector-General

ORCHARDISTS!

Are your trees producing all you expect of them? Didn't you omit that Spraying just when the fruit was forming? What was the trouble? Was it Leaf Curl, Shot Hole, Peach Freckle, Brown Rot, Prune Rust, False Melanose, Collar Rot, Scabbing, Sooty Mould, Wither Tip, or Black Spot? What does it mean? It means that you lost probably four shillings in every twenty!

Write for your free copy of booklet and chart.—It is brief and practical.

ELDER, SMITH, & CO. LIMITED

84-88 William Street, Melbourne

"CARLTON" DEFINITELY INSURES AGAINST LOSS FOR 1d. PER TREE

LAST SEASON numerous growers who used Inferior brands lost scores of apples by grub from every tree. Had they spent 1d. per tree extra, and used "Carlton" they would have saved the cost many times over.

NOTE THE FOLLOWING FIGURES:—

Average quantity of Spray per tree	1 gallon for each spraying
Cost of "Carlton" (4 lbs. to 100 gal.)	¾d. per tree
Cost of other brands (6 lbs. to 100 gal.)	½d. ,,
Extra cost of "Carlton" per spraying	¼d. ,,
Total extra cost of four sprayings	1d. ,,

Independent tests by the N.S.W. Department of Agriculture, as reported in their "Agricultural Gazette," March, 1920, shows that "Carlton" possesses, amongst others, the following points of superiority:—

1. "Carlton" is one of the only two brands having good flotation qualities—it remains evenly distributed through the spray liquid.
2. "Carlton" has nearly 100% finer particles, thus insuring greater spreading and adhering qualities.
3. "Carlton" as it is sold, contains from 20% to 33% more arsenic acid (the poisoning element) than any other paste analyzed.

"Carlton" combines ALL the essentials of a first-class article

EVERY DRUM GUARANTEED

Further particulars from — F. R. MELLOR — Suppliers of Everything :: for the Orchardist ::

440 Elizabeth Street, Melbourne

The "BANYULE" Jersey Stud

HEIDELBERG — 8 miles from G.P.O., Melbourne

The Leading Type and Utility Herd **The Home of "Audrey's Lord Twylish" (985)**

YOUNG STOCK FOR SALE

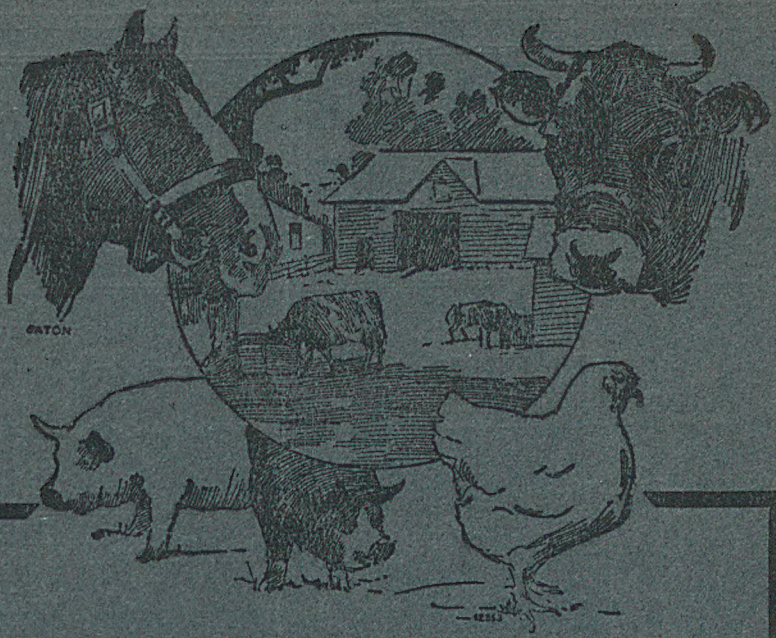
Inspection and Correspondence cordially invited.

C. GORDON LYON, "Banyule," Heidelberg. 'Phone Central 1498, and Heidelberg 16

—AND—

R. R. KERR, "Banyule Farm," Heidelberg. 'Phone Heidelberg 125

By Authority: Albert J. Mullett, Government Printer, Melbourne.



INDISPENSABLE TO THE PRODUCTION OF PRIZE WINNING STOCK

"Polly" Brand Feed

"POLLY" BRAND FEED is just maize with the germ and surplus starch removed, toasted, and made appetising, then disintegrated into powder and put up ready for mixing and immediate use. Is rich in Protein, viz., 20 per cent. guaranteed.

COWS fed on "Polly" Feed will yield 20 per cent. more milk.

HORSES thrive better on "Polly" Feed because the heavy and indigestible starch proportion is removed and the feed is muscle and bone forming.

"POLLY" FEED does not weevil or germinate and it does not turn rancid with age.

Maize Products "Oil Meal"

MAIZE OIL MEAL is toasted and tasteful, does not germinate or turn rancid with age or storage. Ready for use as a mash at a moment's notice.

CALVES thrive on **"OIL MEAL"** better than any other.

POULTRY of all kinds do better with **"OIL MEAL"** than with any other.

FATTENING PIGS.—For fat bacon nothing is more successful for weight and flavor.

MAIZE OIL MEAL differs from our "Polly" Brand Feed in that the latter is cheaper and produces bone and muscle, whereas Maize Oil Meal produces bone, muscle, fat, and a glossy and beautiful coat.

"MAIZE OIL MEAL"
Put up in 100-lb. bags

"POLLY" BRAND FEED
Every bag guaranteed

Write for prices and further particulars

MAIZE PRODUCTS

PROPRIETARY —LIMITED—

FOOTSCRAY, VICTORIA

'Phones—Footscray 367, 368

VICTORIAN RAILWAYS

PICTURESQUE VICTORIA

SUMMER EXCURSIONS

The Victorian Railways issue **Summer Excursion Fares** to the **Seaside, Mountains, Rivers, Lakes, and Caves, from 15th October till 30th April**

MOUNT BUFFALO

Excursion Fares all the year round

First-Class Special Inclusive Week Tickets

covering Transport and Accommodation, at the "Government Chalet," are issued on Mondays by the 6.15 p.m. train, and on Fridays by the 4 p.m. Express train, at **£8 16/-**

Excursionists wishing to travel by motor from Bright may do so, weather permitting, on payment to the Coach Company at Bright of 12/6 extra.

Special Inclusive Week Excursion Tickets

including Accommodation, &c.

HEALESVILLE

Rail, Coach Drives, &c., **£4/1/7**

WARBURTON

Rail, Coach Drives, &c., **£3/14/4**

Lakes Entrance & Buchan Caves

including Rail, Boat, Motor Car, and Motor Launch Transport, Accommodation, Coach Drives, and Motor Launch Trips.

Victorian Government Tourist Bureau

Opposite Town Hall, Collins Street, Melbourne

Full Information supplied in regard to **Excursions, Tourist Resorts, Accommodation, &c.** **Tickets issued daily**

Handbooks, Maps, and Hotel Guides Free on application.

Telephone Nos. 2898 and 2899 Central

GEO. H. SUTTON,
Secretary for Railways.